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SURGICAL, OPERATIVE,
AND
MECHANICAL DENTISTRY.

THE SUBSTANCE OF A SERIES OF LECTURES

DELIVERED BY

L. CHARLES DE LOUDE,

SURGEON DENTIST, LECTURER ON THE ANATOMY AND PHYSIOLOGY OF THE TEETH, MEMBER
OF SEVERAL LEARNED SOCIETIES, ETC.

WITH FOUR PLATES.

INTENDED AS A GUIDE TO YOUNG PRACTITIONERS IN THE DENTAL
PROFESSION,

MEDICAL STUDENTS, AND THE PUBLIC IN GENERAL,

SO AS TO GIVE THEM

A THEORETICAL AND PRACTICAL KNOWLEDGE

OF DENTAL OPERATIONS,

THE BEST MEANS OF PREVENTING IRREGULARITIES IN CHILDREN'S TEETH,
STOPPING OF TEETH,

THE MOST APPROVED CONSTRUCTIONS OF ARTIFICIAL TEETH,

WITH VARIOUS

USEFUL RECIPES OF SUBSTANCES FOR THE STOPPING OF TEETH, DENTIFRICES,
LOTIONS, POWDERS, ETC.

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TO MY PUPILS

THE FOLLOWING PAGES ARE INSCRIBED AS A MARK OF REGARD AND GREAT RESPECT

FOR THEIR ZEAL,

EVINCED IN THE PURSUIT OF DENTAL SCIENCE,

BY

THE AUTHOR.

ERRATA.

Page 1, line 7, for *Kocker* read *Koecker.*

Page 5, line 12, for *filled* read *filed.*

Page 5, in the first note, for *gregas* read *greges,* and for *lavaero* read *lavacro.*

Page 6, in the note, after *jejuna* read *loquatur.*

Page 11, line 20, for *Swieter* read *Swieten.*

Page 89, line 15, for *mucous* read *matter.*

Page 133, line 15, for *fig.* 2 read *fig.* 11.

Page 150, line 5, for *taught* read *thought.*

SURGICAL

AND

MECHANICAL DENTISTRY.

INTRODUCTION.

Scores of volumes have been written on the teeth, since the time of Herodotus to the present, in France, Italy, Germany, and England. The first claims, with some reason, the merit of having produced the most interesting and instructive publications in this branch of anatomy. England has had its *Hunter*, *Fox*, *Blake*, *Fuller*, and, lately, *Kocker*, *Bell*, *Snell*, and *Waite*, with many others, who all have written and added to the science of Dental Surgery. I have read them all; studied with attention, and thirty years' practice as a dentist has enabled me to experience a vast deal in the diseases and operations of the mouth. At the suggestion of many of my pupils, I have been induced to publish the lectures delivered to them on various occasions: should they prove to be of use to those who make Dentistry their profession, or of any interest to the reader in general, I shall feel myself amply rewarded. My chief motive, however, in publishing these pages is to be of some service to young beginners, and to acquaint the general reader what may be required, so that he may judge before he puts himself under the care of the dentist, for no profession has been more vilely abused, as any pretender may, with impunity, set up as a dentist, without possessing skill, knowledge, or experience. Such the law allows in England!

The human teeth not only form the main point in our personal appearance, but are also chiefly the instruments to cause perfect articulation, so as to give a distinct sound and utterance to our vocal expressions. They are the masticating apparatus, or grinding mill for our food and nourishment, and without the functions of them, we should be most miserably situated in respect to preparing our food previous to its being sent to the stomach for nutrition. A perfect healthy set of teeth is the sure indication of youth, health, and vigour; the means of a clear and audible delivery of speech; the cause of the even and gradual digestion necessary to our health; and last, not least, one of the most prominent and striking features in the beauty of the human countenance; for no matter in whom, be the figure ever so graceful, the body all symmetry, the cheeks tinted like the rose, the eyes sparkling with intellectual lustre, the hair flowing in gold or raven black ringlets on the alabaster neck of female beauty—if all these exist, and the mouth be wanting its pearly row of teeth, we shrink with repugnance, and pity the being whom a few moments before we were gazing on with delight. And yet, convinced and aware of the absolute necessity of those indispensable auxiliaries, is not the unpardonable neglect, which so many individuals of both sexes are guilty of bestowing on this most important and beautifully constructed organ, surprising, particularly when all have it greatly in their own power, with a little attention and care, to have, if not beautiful, at least clean and somewhat more regular teeth, by avoiding disease and a train of unpleasant attendant consequences? Scarcely is there a house containing a number of inmates, where either neglect, immoderate use of animal food, or frequent resort to quack medicines, most of them containing great abundance of calomel, has not caused to most of them, if not all, despoliation in the mouth, gums, or teeth; fetid breath, or spungy gums, which when touched begin to bleed, if not to emit matter; the teeth loose in their sockets, loaded with offensive concretions of tartar, and if not totally lost, most of them decayed, showing their sooty or coal-black rottenness every time the mouth is opened. What an unpardonable neglect! Individuals, perhaps in every other respect cleanly in their persons, to be thus careless in their mouths! Yet all this may be remedied, and properly put right again, by applying to a skilful dentist, who will in a short time give ease and comfort to the sufferer.

The teeth are living, and possessed of sensibility: they have a cavity in their internal part, on the surface of which ramify the nerves and blood vessels which confer vitality upon them. The nerves are derived from the fifth pair, by which the teeth have a nervous communication with the stomach, lungs, the tongue, ears, and eyes; so that by a diseased state of the teeth, the organs of digestion, respiration, taste, hearing, and vision, may all or any of them be affected. The uses of the teeth are, first, to masticate our food; secondly, to modulate the voice; and, thirdly, to give expression and beauty to the countenance. Nature has provided us with teeth for the mastication of our food, and when they are lost, our reason or sagacity teaches us how to prepare our sustenance, or, by artificial means, to supply, in some degree, our usual strength and vigour. Yet there are some (happily the number is small) who will look upon the idea of having artificial teeth put in their mouth as a vanity, and will consider it as a novelty of modern invention. It is quite erroneous; for amongst the ancient and polished nations, an attention to cleanliness and the beauty of the teeth was considered so highly important as in some instances to be enjoined as a religious duty. The Bramins make the cleaning of the teeth a religious observance; the Hebrews considered the teeth of great consequence, and punished their loss by the strict law of retaliation, "an *eye for an eye*, and *a tooth for a tooth*." Solomon, one of the wisest and gayest Sovereigns of antiquity, wishing to pay a compliment to the beauty of Queen Sheba's teeth, said, "Your teeth are like a flock of sheep even shorn, which come up from the washing!"* St. Jerome, in his old age, had his teeth filled, in order that he might with more clearness and facility speak the Hebrew tongue. The orators of antiquity were exceedingly anxious to preserve their teeth, and when they were lost, procured artificial ones, made of bone or ivory. Among the Romans, in the duties of the toilet, the teeth claimed a large share of attention, and if wanting, their places were supplied by artificial ones. Ovid, one of their poets most acquainted with the common intercourse of familiar society, recommends as a remedy against love, to "*make her smile who has bad teeth*."† He also recommends to those who have bad teeth, "never to approach near to those they address, and never upon an empty stomach."* So, if we see that, from the most early period, a great attention has been paid to the care and preservation of those most useful auxiliaries the teeth, how unpardonable is it to neglect them? Unfortunately, however, in Great Britain any pretender may set up, and state himself a dentist, without the least knowledge whatever. Teeth are worthy objects of the anatomist, the physiologist, the chemist, the naturalist, and the practical surgeon; for it is dreadful to reflect upon the injuries to health, and the actual causes of mortality which are daily levelled upon the unwary, by buffoons, by chatterers, by quacks, and the most illiterate impostors, in meddling with disordered teeth.

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* "Dentes tui sicut gregas tonsarum quæ ascenderunt de lavaero" —*Cantic Canticor*, c. 4, v. 2.

† "Si male dentata est; narra, quod rideat, illi"—*In lib. Remed Amor*, v. 339.

L. C. DE LOUDE,

LATE OF TOXTETH PARK, LIVERPOOL.

Church-street, Wolverhampton,
May 1, 1840.

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* "Cui gravis oris odor, nunquam jejuna;
Et semper spatio distet ab ore viri."

Art. Amat. lib 3, v. 277.

FIRST DENTITION.

DENTITION IN ITS EARLY STAGE.

From the first commencement of life in the fœtus, by examining the dental arcades of the upper and lower jaw there will be found on the edge of each jaw, in a shallow groove, a pale yellowish jelly-like matter,* partly equally divided in little groups of globular vessicles, lying on and connected with the blood vessels and nerves running along each maxillary arch, and likewise adhering to the sides of the groove. (See plate I, fig. 1.) Some time afterwards, transverse filaments of bone shoot across from one side to the other of the bony groove, to form the alveolar sockets, and the globular vessicles become separated in their respective cells to form the temporary or milk-teeth; at this period, too, the globular vessicles, having increased in size and form, throw off a small process containing the essential substance, which in time is to form the permanent tooth; this process is connected with its parent rudiment, that is to be the primary or milk-tooth, and contained in the same compartment. (See plate I, fig. 2.)

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* This yellow jelly-like matter is stated by some authors to possess an alkaline acid taste.

Bell says,* "It commences in a small thickening on one side of the parent sac, which gradually becomes more and more circumscribed, and at length assumes a distinct form, though still connected with it by a pedunale." In proportion as the rudiments or pulps increase in size, they become separated by degrees into little cells, one behind the other, still connected by a fibrous cord, which remains a conneeting link even long after the primary tooth has made its appearance through the gum. The ossification and crystallisation that is to form the bone and enamel of the tooth, begins likewise at a very early period in the fœtus, though several writers differ as to the exact period, which, in my opinion, must greatly depend on the state of the health of the mother.

It is generally admitted that the ossifieation commences first on the top of the pulp, to form the points of the teeth that are to make their first appearance through the gum.

Cuvier asserts that the crystallisation commences first between the pulp and the internal covering of the vessicle; however, the crown of the tooth, and particularly the elevated points of it, become first consolidated. This calcareous deposition first takes place on the several points that are to form the elevations and edges of the tooth, crystallisation gradually goes on to form the enamel, whilst the lower part elongates to form the roots, and the upper part makes its way through the gum.

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* Bell's Anatomy and Physiology of the Teeth. p. 61.

The period at which the teeth make their appearance through the gum varies greatly, and according to the state of the health of the parents, nurse, or constitutional powers of the child. Some children have been born with *two* or more teeth, whilst others required several months, and in several cases two or three years,* over the general period, before they appeared; generally, however, between the sixth and eighth month the two front teeth of the lower jaw will appear first, and from two to three weeks after, the two upper front teeth are seen; next the lateral incisors of the lower jaw, after which those of the upper jaw, then the canine teeth of the lower jaw, after those the canine teeth of the upper jaw, and lastly, the two molares, or grinding teeth, on each side of the upper and lower jaw; this, generally speaking, will require from two to two and a half years, and will, as I have stated before, greatly depend on the constitutional powers of the child.*

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* "*Van Swieter* and *Haller* mention several instances where infants have cut their teeth a few weeks after being born. *Polydore Vergillius* states a case of an infant being born with six front teeth. *Rayer* asserts a case of a young woman who did not get her four canine teeth until she was thirteen years old. *Fouchard* and *Bourdet* mention individuals who never got teeth at all, as well of some having got but a few"—*Anatomy du Sistême Dentaire.*

The temporary teeth, twenty in number, namely, eight incisors, four canine teeth, and eight double teeth, or molares, frequently produce a great deal of pain, irritation, and fever, while the process of formation is progressing, until they have cut through the gums of the infant. The most alarming consequences have been the result, if not minded and properly treated. How painful to see the little sufferers, in restless agony, thrusting their little fingers to the irritated parts of the mouth, as if to point out where it pains them. Yet this, in the hands of an experienced dentist, may be easily ameliorated, if not instantly removed.* Whenever an infant is thus affected, the inflammatory symptoms may be reduced by small doses of rhubarb and magnesia, or a couple of grains of calomel; the warm bath may be used with great advantage; the mouth should be examined, and by rubbing the gums gently with the finger, previously dipped in a decoction of sage leaves and weak vinegar, will give great relief; if not sufficient, and the gums appear on examination greatly inflamed, swollen, in little detached risings, which, on being rubbed with the finger, show a whiteness and a feel of a hard substance, recourse must be had to the lancet, which should be used with a firm hand, in making an incision along the edge of the hidden tooth, so as to divide completely the part where the pressure requires it. The operation is simple, and easily performed, gives no pain, but immediate relief. The only precaution required in using the lancet for the operation is, to make the incision to the outer side of the jaw, so as to avoid injuring or cutting the "cord of connection" that unites the temporary tooth with the permanent one. Young beginners I would advise not to lance the gums until really required, as by lancing the gums before the hidden tooth is sufficiently risen to make its appearance, the divided parts will heal again, and become harder and more resisting to the passage of the tooth, which would then require a repetition of the same operation.

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* *Alphonse le Ray* says, "I have often seen that an infant has cut a tooth or two long before its time, particularly when the nurse had been affected with fever, or over heated, which produced an inflammatory engorgement; the suck, then overcharged with caloric, accelerated the dentition of the infant. Like those plants provoked to grow and blossom by artificial forcing heat, and too fecundent waterings, their precocious and weakly blossom droops without producing fruits: thus those early teeth of those children decay soon, and are lost at an early period."

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* "In the most favourable cases the gums are red, enlarged, and painful, and a disposition to fever occurs, usually attended with an unhealthy action of the liver.

"The general symptoms, however, frequently assume a more severe and alarming form.

"The skin is hot and dry, the pulse rapid and fluttering, the respiration quick and laboured, and the countenance expressive of extreme anxiety and pain. The difficulty of breathing often increases to an alarming degree, with painful inspiration, cough, and, in short, every symptom of *pneumonia*. The brain, too, is frequently affected; the eyes permanently expanded; the head is constantly moved to and fro with an uneasy and restless motion, accompanied with incessant moaning; spasms succeed, and convulsions, with increasing violence (unless immediate relief be obtained), terminate at once the little patient's sufferings and existence!"—*T. Bell on the Teeth.* p. 69.

Suppose we are now arrived at that period when the twenty temporary or milk-teeth (ten in each jaw) are through the gum; this generally will be betwixt the second and third year. Very rare indeed will it be found that those teeth are uneven, irregular, or differing in their formation, in one child from another; at least, during an extensive professional experience of several years, I have never seen a single instance.

However, at this period, when those twenty primary teeth are planted in the upper and lower jaws, commences the necessity of the parents, nurse, or those who have the care of children, to examine carefully, and to watch how the process of dentition proceeds; upon this will depend every result, in respect to the future regularity or irregularity of the teeth.

If we consider that at this period the under and upper jaws are crowded to their full extent with the teeth already through the gum, and the rudiments of thirty-two permanent teeth lying in their respective cells at the back of them, to make their appearance in proportion as the primary teeth make their exit (see fig. 3, plate I), it must convince the reader, that the jaw containing these fifty-two teeth at one time, twenty-six in each jaw, closely crammed and wedged together, must be liable to many injuries and accidents, by falls, blows, or the use of various medicines, particularly such as contain calomel or mineral acids, which, if any of the first do happen, or any of the second are made use of, must, of course, not only affect those in view, but likewise injure those that are to replace them, and be the first cause of derangement, or irregularity in their formation, even if the span of the maxillary arch of the jaw is in proportion to admit an even arrangement of the second set.

It has already been stated that the rudiments of the permanent teeth are connected by a fibrous cord with the temporary set, as may be seen in fig. 4 and 5, plate I. They must of course in a great measure depend on them.

If no injuries of any kind occur to derange or displace the temporary set, nature going on progressively in its operations, it will require but little attention to prevent irregularities; for in proportion as the root of the temporary tooth becomes absorbed, the secondary tooth increases; the former drops out, or is lifted out, and the permanent tooth advances in its place.

In many instances, however, the rudiments of the secondary teeth are large, and the maxillary arch narrow, too much so to allow them to stand in an even row; in this case the first tooth that makes its appearance will take a wrong direction, produce a lateral pressure on the next, and not having room to come straight up or down, will project outwardly or inwardly, or lap over; in such cases some judgment in removing the temporary tooth will be required; but if it be removed, room will be given for the other teeth, which should be occasionally examined, for if one tooth has taken a wrong direction, the others, or some of them, will generally (unless attended to) take an irregular position likewise. The practitioner should not be too ready in removing temporary teeth, unless the case does require it; for as much mischief has been done by removing the temporary teeth too early as too late, for by depriving the maxillary arcade too soon of its teeth, it will cause the development or expansion to be greatly retarded, if not partially destroyed. However, if a dentist be employed, he will know how to act, as an experienced practice alone can teach the true mode of operation.*

The formation of the jaw, or maxillary arch, varies considerably in certain individuals, and may be classified in three principal shapes: 1st, the horse-shoe—2d, the oval—and 3d, the flattened oval; next, the high roof shape and rabbit-mouth shape. Those shapes will vary to certain degrees in contraction or expansion. The teeth, also, vary greatly in size and shape, in length, narrowness, broadness, flatness, &c.

Now if a child be the offspring of parents, the mother of which has a narrow contracted jaw, the father a large jaw, filled and well planted with a set of large broad teeth, or *vice versa*, and the child take after the mother in the formation of the jaw, and after the father in the formation of the teeth, it will be evident that there will be no room for the teeth to occupy the space of the narrow maxillary arch, and, unless attended to, must take a wrong direction: the front teeth will lap over, project like tusks, or grow inwardly, to the great annoyance of the tongue and speech; the grinders will succeed in so close a pressure, and take so unsightly a direction, that the appearance will be repulsive, and, besides, they can never be kept clean (a point of the greatest importance), but will become loaded with concretions, produce a heating to each other, irritating the gums, and, in a short time, become carious and painful, and a total loss will be the issue.

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* *Columbus* advises not to take out the temporary teeth, unless necessary, and with great caution, as "Their roots," he says, "serve to the development of the permanent teeth."

Most evils have their remedy. In this one it becomes the duty of the dentist to examine with care, and adopt those means best calculated to repair the mischief done. He ought to judge how much room the teeth will require to bring them in an even direction, and in proportion make room for them, by extracting one or two teeth. I generally have extracted, to obtain my aim, the second bicuspides on one or both sides of the jaw; but in this the dentist may be guided by circumstances and the ease of the patient. If this irregularity is attended to at its commencement, it may be soon and easily remedied; but if, on the contrary, it is of long standing, it will require, after the bicuspides are removed, a gold or platina plate (made on a model of the mouth), perforated with small holes opposite each tooth, then laid over the teeth by ligatures, which should be removed, renewed, and tightened every twenty-four hours, until the teeth are in their regular position; this will sometimes require three or four weeks, or as many months, but by scientific treatment and perseverance the desired effect will be obtained. As all irregularities of the teeth are occasioned by the pressure being thrown in a wrong direction, particular attention must be paid in applying the artificial pressure on the opposite side.

The teeth, though not generally known or observed, are under no mean controul and dependence, for their regularity, to the adjacent parts of the mouth. The pressure of the tongue and cheeks (the one from within and the other from without) gives them their natural and proper arrangement. In cases where the lips have been lost, the teeth invariably project forwards; where the tongue has been wounded, partially cut, or lost totally, the teeth fall inwardly, until they become loose and drop out.

Some time last year I saw a sailor, whose tongue had been cut out by the Arabs, and the total loss of eight front teeth was the consequence; at least, this was the account he gave me, in writing, and I have no reason to disbelieve it.

SECOND DENTITION.

SECOND DENTITION.

The thirty-two teeth that succeed the primary set are divided into three classes; they have each a different shape, and a different duty to perform: the incisors to cut, the canine teeth to hold, and the grinders to bruise or masticate. They are classified, viz. the two front incisors, two lateral incisors, two cuspidati, four bicuspides, four molares, and two *dentes sapientiæ.* Each jaw, if complete, will muster its row of sixteen teeth, which are shaped alike in pairs (that is, right and left), grow in pairs, are affected in pairs, and decay in pairs.

If we consider how many years nature requires to complete a perfect set of teeth, what pains, trouble, and anxiety an individual has to undergo, before he is in possession of a well arranged mouth, with the teeth even and regularly planted, is it not surprising, that those who are thus fortunately provided will frequently put no value on them—treat them with neglect and carelesness, until dilapidated or totally lost.

The teeth are composed of bone and enamel, the hardest of all animal substances. Each tooth is divided into three portions, the crown, the neck, and the root, and are generally alike in appearance, though liable to great variation in different individuals. Their shades in colour, too, differ greatly, from yellow white to blueish white, greyish white, dull white, glossy white, opake white, &c. Each of these different tints, connected with their shape, to the experienced dentist becomes a sure guide to form his prognosis, and will tell him to adopt the treatment and operations accordingly.* Without digressing from this subject, for my part, I have no hesitation to believe, that if the study of the human teeth were more encouraged and thoroughly understood, we might arrive to such perfection as to introduce a new science, which might be called *Dentology*, by which science the social and moral habits, propensities, diseases, and character, might become known to the practised dentist, with more accuracy and certainty than even phrenology. For my part, I can only say, the extensive practice, and the many thousands of mouths I have examined, has given me so clear a perception that, on a close examination of the dental arcades and the colour and shape of the teeth, generally I have been correct in the opinion I have formed of their possessor. This is, however, no novel discovery of mine, for in 1792, "Le Dentiste Observateur," by *Le Citoyen Mahon,* published in Paris, introduced hypotheses and opinions more positive.*

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* "Les dents ne sont pas importante seulement sous le rapport des fonctions qu'elles remplissent dans l'economie, elle peuvent encore fournir au médecin et au zoologiste d'importantes données pour la détermination de l'age, du régime, et, jusqu'à un certain point, des mœurs et des habitudes des animaux : aussi comprend on aisement tout le soin qu'on doit apporter dans leur étude"—*Systême Dentaire, par Blondin.* p. 55.

The teeth greatly vary, likewise, in their texture, in hardness and brittleness, and, of course, will, in proportion to this state, be affected accordingly.

By chemical analysis it has been proved that the bony structure of the teeth, like other bones, is composed of an earthy and cartilaginous portion; the earthy matter may be dissolved by immersion in mineral acids; the cartilage which remains retains its form, and is more solid than the same substance in other bones.†

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* "Moyen de connoître par la seul inspection des dents, la nature constitutive du tempérament, ainsi que quelques affections de l'ame; avec des recherches et observations sur les cause des maladies qui attaquent les dents depuis l'état du fœtus jusqu'à l'age de puberté, &c." —*Traité sur le Dents, par Citoyen Mahon, Dentiste. Paris,* 1792.

† If a tooth be put in diluted muriatic acid, the decomposition

The enamel is an extremely hard, milky white, semi-transparent substance; so hard that, when struck with a steel, fiery sparks may be seen: it is composed of earthy salts, chiefly phosphate of lime, and, according to *Berzelius*, the enamel of the adult teeth contains in every hundred parts—

Phosphate of lime	85.3
Fluate of lime	3.2
Carbonate of lime	8.0
Phosphate of magnesia	1.5
Soda and muriate of soda	1.0
Animal matter and water	1.0
	100

The experiments in decomposing the bone and enamel of the teeth, by *Pepy*, *Fourcroy*, *Vauquelin*, *Wallaston*, and *Brandt*, differ but little, though we might, with reason, suppose that there may be a shade of difference in the component parts of the bone and enamel in the teeth of different individuals, according to the hardness of their enamel.

If a tooth be split in two, the stratiated enamel will

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will take place immediately, the tooth being removed when the earthy parts are dissolved. By dropping a few drops of sulphuric acid in the mixture, the earthy parts will be precipitated, in a whitish powder, to the bottom.

be seen commencing thinly round the neck of the tooth, and increasing in thickness towards the surface to its points. In the centre of the bone of the tooth is the canal, somewhat resembling the tooth in shape, in which cavity the nerves and arteries, with their ramifications, are located, in connection with those along the maxillary arch, the rupture of which, when the tooth is extracted, causes excruciating momentary agony.

The teeth, standing in their alveolar sockets, their roots enveloped in their membraneous lining (a net-work or tissue of the most minute blood vessels), the spongy bony structure in which the teeth are planted, forming a cellular location for them, and known by the name of "the alveolar processes," are, likewise, most admirably adapted to the duty those organs have to perform, the cancellated arrangement of the osseous fibres absorbing the vibrations, and preventing their propagation of sound.

The teeth, thus standing in their regular arrangement, form a barrier to the escape of the saliva from the salivary glands, so essential to the digestion and nutrition of the individual. Hence the dribbling of those who have lost the front teeth, as well as of those who are in the habit of sleeping with their mouths open.

The pleasant and gratifying sensation of eating is known by every one, and yet very few have given a single thought to the manner in which this most beautifully constructed organ operates in this necessary arrangement to support the animal economy.

First, the food is put to the mouth, which mechanically opens, seizes upon the morsels offered to it, and, with one bite of the front teeth, it is divided; the tongue, that active and pliant muscle, instantly, with one move, brings it to the right or left side of the mouth, under the operation of the grinding teeth; the lower jaw, which is moveable in different directions, forwards, backwards, and partial rotation, by its depression and elevation, performs the operations necessary for the mastication of the food; the tongue, by the action of its muscular fibres, assumes the required changes in breadth, length, concave, or convex, to the different parts of the mouth, so as to bruise the softer parts of the aliment against the palate, to mix it with the saliva, or to place it under the pressure of the teeth, and when the food is thus well masticated into a pulp, the whole is sent to the stomach for nutrition. Those who eat slow, and grind or masticate their food so as to mix it well with the saliva before it is swallowed, will find the benefit of it very soon.*

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* "By the combined action of the muscles of the lower jaw and tongue, and that of the teeth, the food is bruised, cut, torn, and divided into minute fragments. This operation is of so much importance, that the whole process of digestion is imperfect without it. It

The influence the teeth have upon the articulation, and upon the delivery of our thoughts, by a distinct, sonorous, and audible pronunciation, is known to all. The loss of a single front tooth of the upper jaw causes lisping, and a dribbling of the saliva, when speaking, if any of the front teeth of the lower jaw are lost. The loss of a grinder will not only cause a falling in of the cheek, and premature appearance of old age, but will immediately affect the proper mastication, and pave the way for further derangement of the whole apparatus.

We see, then, that nature has provided us with teeth for mastication, articulation, and personal appearance.* Good healthy teeth are looked upon as the sure indication of a strong, robust constitution, but sel-

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is proved, by direct experiments, that the stomach acts upon the aliment with a facility in some degree proportionate to the perfection with which it is masticated. If an animal swallow morsels of food of different bulks, and the stomach be examined after a given time, digestion is found to be the most advanced in the smallest pieces, which are often completely softened, while the larger are scarcely acted upon at all"—*Southwood Smith.*

* "When the teeth are lost, it is impossible to make use of solid food; and if the stomach is then loaded with pieces, without being masticated, the person is exposed to the most distressing indigestions; the stomach loses its power of contraction, and it becomes weak in proportion as it no longer digests. We can only then remedy that state of languor which is the consequence, by replacing teeth in lieu of those which are lost"—*De Shemant.*

dom will it be found that the teeth are equally as good as they are beautiful, or as beautiful as they are good. To unite those two qualities, the teeth should not be too large nor too small, nor too white nor too dark; not a single streak, speck, unevenness, or tuberosity should be seen; in short, the enamel must be even and polished.

From this it will be seen, that it is by no means surprising that so few handsome teeth are to be met with, and as the teeth form part of the body they belong to, they must necessarily partake and have a "co-relation" in proportion to the other parts of the body: from this the experienced dentist will draw his conclusions, and find the causes of their defects, and become acquainted with the different periods at which the constitution became affected by disease, or illness.

THIRD DENTITION.

THIRD DENTITION.

In general, at the commencement of formation, the upper and lower jaws of man contain but two rudiments to form the primary and permanent teeth, which, consequently, can only produce the two sets of teeth calculated to perform the functions for which they are intended during the period of our existence. Occurrences varying from this general arrangement are very rare, and have been doubted by many; but the number of well authenticated cases on record must convince even the most incredulous that nature does occasionally deviate from her regular rules, and shew us her various processes and powers, by causing a third dentition to take place, and, according to some writers, even a fourth.

Gehler,[*] who wrote a book on the third dentition, mentions a case where a canine tooth had been extracted three succeeding times, and was three times reproduced.

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[*] De Dentitione Tertiæ. Leipsic, 1786.

Albinus[*] saw a canine tooth of the upper jaw, which had been extracted at an early period, succeeded by a new tooth at the age of twenty-three years.

Diemerbrook[†] observed it on himself at his forty-sixth year.

Serres[‡] says, "I have this present moment, in the hospital De la Pitié, a man, thirty-five years old, who lost his two front teeth of the lower jaw by accident, at the age of thirty. A few months after he was much surprised to see those re-appear which he has at present. These third teeth are much smaller than the adjoining ones, and are always a little loose, perhaps on account of the alveoli not being close enough round their roots."

Joubert mentions a lady of rank who had lost all her teeth; that twenty new teeth made their appearance through the gums at the age of seventy.

Sennert mentions a similar case of a lady of Silesia, who, nearly at the same age, received twenty new teeth, accompanied with much inflammation and pain, as experienced by children on their first dentition.

Eustatius states, that the four incisors having been extracted from a young man of twenty years old, they were replaced by four new ones within a year's time.

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[*] Element Physiol. tom. viii. p. 22.

[†] Anotat. Acad. lib. 1, tab. iii. fig. 3.

[‡] Anatomie et Physiologie des Dents. p. 130.

Dr. Du Fay, of the port of L'Orient, states that he has seen in that town a man of eighty-four years old, who received two incisors and two canine teeth.

Hunter[*] likewise mentions instances where a number of third teeth made their appearance after seventy years.

Blondin[†] has found in the jaw of an adult, immediately underneath the first grinder, a tooth, of which the crown was nearly full grown. Both the small grinders on that side existed.

The Academy of Sciences give, in one of their reports,[‡] a case of an old man of seventy receiving, within two years, two incisors and two canine teeth.

Van Swieten mentions having seen appear two molares in the mouth of a woman eighty-six years old.

Van Helmont[§] saw a third dentition in a woman of seventy-three, accompanied with all the pains and symptoms observed at the first dentition in children.

Bacon[||] states that the Countess of Desmond, at her hundred and fortieth year, received, at her third dentition, a number of new teeth.

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[*] Natural History of the Human Teeth, p. 84.

[†] Anatomie du Systême Dentaire, p. 137.

[‡] Académie des Sciences, 1730, p. 56.

[§] Helmontius, in Arcana Paracelsî, p. 626.

[||] Hist. Vit. et Mort. Col. 536.

In the "*Çollection Académique*"* a most interesting case is mentioned by *Dr. Christian Mentzelius.* "Having (says he) accompanied the Elector of Brandenburgh in his journey to Cleve, in 1666, there arrived in that town an old man, of a hundred and twenty years old, who exhibited himself for money, and which man I saw at the court of the Elector. The strength of his voice and lungs was powerful, having run through the scale, or gamut of musical sounds, which could be distinctly heard at a distance of more than a hundred yards. He afterwards opened his mouth, and showed us his upper and lower row of beautiful teeth, well planted, even, and white as pearls. On alluding to the beauty of his teeth, he related to us the following:—'Being in the Hague, in Holland, two years before (where he exhibited himself likewise), being then one hundred and eighteen years old, he learned that there was in that town another old man (from England), of the age of one hundred and twenty; that he went to see him, and spoke to him in the following manner:—We are nearly of the same age, as I am only two years younger than you. I have had the greatest curiosity to see my senior in age. As yet I have not felt the slightest inconvenience; but during the last three days that I have been here, I have felt a great head-ache and violent pains in my jaws; so much so, that I am persuaded God will soon take me out of this world. You are mistaken, my dear friend (said he); you are getting young, and are teething like a child. The same thing happened to me when I was a hundred and eighteen, which was the same age you are now. O! I pray to God (said I) not to punish me in prolonging my days. After which I left him, put myself to bed, and experienced, for several days, the most excruciating and violent pains in my jaws and gums, and all the teeth you now see came in succession, one after another.'"

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* Tom. iii. p. 550.

The preceding well authenticated facts are a few which I have selected from the numerous cases stated by several credible authors of different countries; and incredible as they may appear, there can be no doubt of their occurrence, although, as stated before, on examining the jaw of an infant, there is only found the primary sac, or rudiment of the primary tooth, which throws off a second bud or sac, to form the second or permanent tooth. It is not improbable, nor impossible, that nature, in her processes, may throw off a third, and even a fourth bud, to form, in time, a third or fourth succession of dentition. There can be nothing more extraordinary in this than there is in finding individuals with additional fingers to their hands and toes to their feet—individuals with one or three testes—children with three or four legs or arms, or some without either—children grown back to back, or united by a cartilaginous muscle, like the Siamese youths. That the primary pulp, or sac, may throw off a third or fourth rudiment or bud, to form a tooth, may be easily conceived, when we consider the formation of the supernumerary teeth, which are found more common, and of which I shall speak by and by.

Most authors differ materially as to the cause which produces this third dentition; but whatever may be the cause, it is certain that a third dentition, when it does take place, can be of very little use, but of much trouble. If we examine the jaws of old people, and consider the hardness of their gums, almost cartilaginous, the absorption, or nearly wasted state of the alveolar processes, we can scarcely conceive how the third set of teeth force their way through the gums without causing a succession of violent pain and inflammation.* *Hunter* justly remarks, that "this third dentition, instead of being a blessing of nature, is quite the reverse, particularly if it happens to an old individual who has lost all his teeth; and especially where they come in the one jaw and not in the other, they are rather hurtful than useful, for in that case we are obliged to pull them out, as they only wound the opposite gum."†

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[*] "Those teeth, being unsupported by alveolar processes, are always loose and useless, and generally excite so much irritation as to require their speedy removal"—*T. Bell, Anatomy and Physiology of the Teeth*, p. 111.

[†] Hunter on the Teeth, p. 85.

THE ALVEOLAR PROCESSES.

THE ALVEOLAR PROCESSES.

Upon the edge of each jaw is placed a soft spongy bone, from half an inch to an inch high, pierced with cavities or holes, which constitute the sockets, called alveoli. Those sockets are distinct, and separated by a thin partition, and are exactly shaped to hold the roots of the teeth. This spongy bony structure is called the alveolar processes (processus alveolares). The structure of these processes, being a loose and spongy bone, is admirably adapted for absorbing vibration and checking the transmission of sound. They are the means of supporting and keeping the teeth firm in their place. In proportion as the teeth decay or drop out, this bony structure wastes, or is absorbed. The roots of the teeth being exactly in shape like the alveoli, are neatly and firmly planted in them, and surrounded by the lining, or periosteum: they are single cells for the incisors and cuspidati. For the bicuspides, or small grinders, those cells are frequently double, as they also are for the molares of the lower jaw. In the upper jaw the alveoli for the back grinders have each three cells; for the dentes sapientiæ they frequently have but one cavity. Such is, generally, the arrangement of the alveolar processes, though many instances may be found where the molares have four and five roots. I have in my collection a second molare of the upper jaw, with six distinct roots, and though the upper and lower incisors and canine teeth are generally single rooted, I have seen some double rooted; but of course, whenever this exists, the alveoli will be divided into as many compartments as required by the number of roots to enclose the fangs they are intended for. The inner and outer plates of the alveolar processes are often liable to serious accidents by extracting a tooth, if not skilfully performed, viz. part of the processes being torn away or exfoliated, which, in some constitutions, becomes very troublesome and tedious to heal.

The roots of some teeth, too, diverge greatly in their roots, or are curved. If so, accidents can scarcely be avoided; but of this I shall speak more distinctly under the head of extraction. Instances are not uncommon where there exists a connection or ossification between the root of a tooth and the alveoli, and when that is proved to be the case, an experienced dentist alone should be entrusted with the operation.

THE PERIOSTEUM.

THE PERIOSTEUM,*

Or lining of the socket, which surrounds the fangs of the teeth, the coating to their roots, and lining to the alveoli, is a membraneous tissue of blood vessels, with its most minute ramifications, commencing from the bottom of the alveoli, where it takes its commencement from the vessels that enter the canal of the fang, or root of the tooth, and surrounds the same up to the cervix, or neck of the tooth (see plate II. fig. 1, 2, 3). This lining adds greatly in keeping the tooth firm in its socket, and, as may be easily supposed, is liable to be injured by accidents: undue pressure, produced by a fall or a blow, or a decayed tooth will, from its interior blood vessels being connected so closely with this coating, produce inflammation and suppuration, occasionally of a serious nature, which nothing can remove but extraction of the affected tooth; if not extracted, great inflammation and a fungous growth of the periosteum will be the consequence. Many able anatomists are of opinion that the periosteum is but a single layer betwixt the alveoli and the root. Others supposed the periosteum to be formed of a double layer. *Bell* is of the same opinion, and supports his argument by stating, "That he has frequently removed a tooth from the dead subject, and found not only the root covered, but also the alveolar cavity lined, with periosteum."*

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* "The teeth, at their fangs, have a periosteum, which, though very thin, is vascular, and appears to be common to the tooth which it encloses, and the socket which it lines as an investing membrane; it covers the tooth a little beyond the bony socket, and is there attached to the gum"—*Hunter on the Teeth*, p. 43.

Some anatomists have advanced the opinion that the sac, which contains the "jelly-like substance" that forms the tooth, becomes afterwards the lining or periosteum of the alveolus. Whether the periosteum that surrounds the temporary tooth becomes absorbed after the loss of its occupant, or whether this primary periosteum becomes connected with that of the periosteum of the permanent tooth, as has been intimated, is a conjecture, and must be left to more minute anatomical researches.

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* Bell's Anatomy and Physiology of the Teeth, p. 43.

IRREGULAR DENTITION.

IRREGULAR DENTITION

MAY be classed under three heads—natural irregularity, irregularity produced through want of attention, and irregularity occasioned by unskilful management or operations. Of the first I shall mention a few cases, stated by reputed authors, which appear to me the most curious and interesting.

Mr. Rugtembeck, a magistrate at Frederickstadt, had only his molares, no canine teeth nor incisors, and lived to a very old age.

A surgeon of the same town, named *Meister Feich*, was equally without his front teeth and cuspidati, and likewise lived to a very advanced age, without getting a succession of teeth.*

Borelli saw a woman, who lived till the age of sixty without getting her teeth.†

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* See Ephémér. des Curieux de la Nature, Déc. 2. an. vi. obs. 122.

† Hollerius ad Consilia, p. 528, xxxi.

Brousèt mentions a child which had only the half of the required number of teeth; the remaining part of the jaw resembled that of an old toothless person.*

Professor Beaumes says, he saw two children who both had a double row of teeth.†

Dr. Arnold, of Breslau, states to have seen a child of fourteen years, which had seventy-two teeth (thirty-six in each jaw), and says, they were healthy, and well arranged in two rows, except the incisors, which slightly deviated.

Summering has seen, in a healthy person, a front tooth placed horizontally and firm, the crown placed forward.

Albinus and *Sandifort* mention cases of a complete inversion, the first of an incisor of the upper jaw, and the second of a bicuspide.

Plouquet and *Summering* have seen five molares, quite even and regular, on one side of the lower jaw, on two individuals.

Melancton states having seen, at the court of Prince Ernest, of Lunenburgh, a girl who had but one tooth in each jaw.

Van Swieten saw a molaris firmly situated in the centre of the palate. A few years ago, a young man of twenty-two years old, called on me in Liverpool, to have a tooth extracted. He had five front teeth in the upper jaw, two front incisors and three lateral incisors, but so regular and even, that the five teeth were all nearly of the same shape and breadth.

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* Education Médicale des Enfans.

† Traité de la Premier Dentition, p. 10.

The irregularities produced by neglect, and those produced by the mismanagement of operations, are spoken of in the commencement of the first dentition in this work. All cases of this description vary greatly, and must be treated accordingly. A regular rule or plan could not be laid down for their treatment: the experience and judgment of the dentist must alone be his guide.

SUPERNUMERARY TEETH.

SUPERNUMERARY TEETH.

Supernumerary teeth, though not very common, will be found occasionally in the mouths of individuals. Those teeth, if allowed to remain, become at times troublesome, and an annoyance to the tongue, cheeks, or lips. They are mostly found at the back or close to the incisors (inwards of the mouth) of the upper jaw, and are thinly shaped, round, and generally pointed. They are easily extracted (if properly through the gum) with a pair of narrow-beaked forceps, which, in every instance, should be done, as they are of no use whatever, but a great annoyance. Before extraction, the operator should feel with his forceps, and first convince himself that the supernumerary tooth stands by itself in the socket, for an instance occurred to an operator in Leicester, in extracting, as he thought, a detached supernumerary tooth, where both the supernumerary and left lateral incisor came out at once, as the roots were joined and lodged in one and the same alveolus. Instances of this kind are very rare, for I have never heard of a similar case, but I saw both the connected teeth when on a professional visit in that town in 1835.

The existence of supernumerary teeth strongly supports the possibility of a third dentition, for, as well as those teeth, additional off-sets, or buds, are thrown off from the primary and secondary pulp.* Had their progress or growth been retarded by any cause, might there not, at a later period, have been a third succession? The supernumerary teeth, it is true, in their form and shape, differ greatly from any of the other teeth, but their existence goes far to support the possibility of an additional off-throw (or formation) from the primary pulp, to produce, in time, a third set.

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* "It not unfrequently happens that the pulp of a temporary tooth, in addition to the rudiment of the permanent one naturally destined to succeed it, gives it also a second process, which produces a supernumerary tooth"—*T. Bell on the Teeth*, p. 102.

OSSEOUS UNION OF TEETH.

OSSEOUS UNION OF TEETH.

Teeth of which the roots and sides are united. During an extensive practice of several years, I have only seen three instances of this description: the first, two incisors of the lower jaw; the second, a front and lateral incisor of the upper jaw; and the third, a cuspidati and bicuspides of the lower jaw. In each of these instances the teeth were closely united, and formed but one bone; the crown of one of them was partly separated. *Summering, Serres,* and *Blandin* mention instances where teeth have been found with the crowns joined together and the roots separated: I never have met with any of the latter. It is said that osseous union of teeth is more frequently found in temporary than in permanent teeth: those that I have seen have been of the latter kind, and must have been produced from one alveolus. From this we may suppose that either the sac containing the rudiment of the tooth (at its first formation) must have possessed the forming principle of two teeth, or that, by some unaccountable pressure upon the two pulps, each of which contained the rudiment of the embryo tooth, they were inclosed in one alveolus, instead of separate ones, and by this means an adhesion or union of the rudiments was caused.

That pulps containing the matter to produce teeth are detached, or dislodged, from the place intended for them, may be supported by the fact, that teeth have been found in parts of the body far away from the mouth, viz. in the ovaries, and in the adjacent parts of the genital organs.

Blumenbach, *Ruish*, *Mochsan*,* and *Blandin* have seen instances of this description. Generally those teeth have been found attached to hairy and greasy substances, in fibro-cartilaginous parts, and at times they have been found planted in the bone in real alveoli. One of the most extraordinary cases of this description I have ever read of is related by *Graefe* and *Walters*,† and were it not for their high medical fame and reputation for veracity, I should consider it incredible.

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* Anatomie Dentaire, par Blandin, 1836.

† " Une femme, agée de vingt-huit ans, scrophuleuse dans son enfance, plus tard bien portante et bien règlée, mariée à dix-huit ans, fut affectée, après son quatrième accouchement, des fleurs blanches, dont l'abondance variait. Les remèdes, généreaux et locaux, étant restés

Dr. Oudet states that he has frequently seen instances where the cuspidati had taken the place of the lateral incisor, and has likewise observed a similar transposition of the first bicuspide and the cuspidati. But to

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sans effet contre cette affection, on examina les parties génitales; on trouva dans le vagin une tumeur qui se rompit par la pression et laissa écouler un liquide puriforme; de la douleur et des accidens spasmodiques s'étant joints à la leucorrhée, on examina de nouveau le vagin, et l'on sentit à sa partie supérieure gauche un corps dur qui, pendant le coït, causait des douleurs au mari. Néanmoins la femme accoucha d'un cinquième enfant, qui portait à la joue gauche une excoriation récente. La malade s'étant fait transporter à Varsovie pour se faire guérir, un examen plus attentif, fit voir à Monsieur Jasinski et à plusieurs autres médecins que le corps dur qu'on sentait dans le vagin, était situé entre le rectum et le vagin, et qu'il ne faisait saillie dans ce dernier que depuis la déchirure de ses parois: qu'en outre, les parties molles formaient comme une calepus autour de ce corps—les accidens causés par le contact du bord aigu de ce corps avec la matrice engagèrent Monsieur Jasinski à en faire l'extraction: il le saisit d'abord avec des pinces à polypes ordinaires; mais l'instrument glissait toujours. Cinq jour aprés il se servit de pinces plus fortes avec lesquelles il parvint à arracher une dent molaire bien formée qui avait trois racines, et dont la couronne était l'égèrement carrée. Trois autres dents incisives et molaires furent encore extraites sans qu'il coulât beaucoup de sang, ni que la malade se plaignit de fortes douleurs. Ces dents paraissaient avoir été implantées dans un os qu'on sentait avec le doigt; mais qui était fixé trop solidement, et qui n'étant pas en contact avec le vagin ou l'utérus fut laissé en place"—*Graefe und Walters's Journal.* See Anatomie du Système Dentaire, par Blandin, p. 181.

return to our subject: with regard to osseous union between teeth, if, as I have seen them united by the roots, they stand (though separated by the crown) in but one alveolus, it must be, in case of caries or any other cause rendering extraction indispensable, a matter of some difficulty, for although it may be necessary to remove the carious tooth, in the operation both will yield to the instrument.

SALIVARY CALCULUS.

SALIVARY CALCULUS.

Tartar (or earthy concretions deposited round the necks of the teeth) is, with few exceptions, formed more or less on the teeth of every individual. That such deposit may be greatly prevented (by cleanliness and care) is sufficiently known to those whose habits are such as to devote the necessary attention to them; whereas those individuals who are guilty and careless enough to permit the accumulation of this filthy substance, will soon find, to their own cost, the consequence.

The teeth most liable to those concretions are the front teeth of the lower jaw, and the back grinders of the upper jaw, particularly those which are least used in mastication.

Some writers on this subject believe and assert, that those earthy particles are formed and deposited from the salivary glands. *Monsieur De la Barre* is of opinion that it is produced by "*une exhalation terreuse et maladive de la membrane muqueuse des gencives,*" and is also of opinion that all other calculous concretions are produced by a similar action of the mucous or synovial membranes.

It would be of little consequence to many of my readers to know by what means those concretions are formed, whether by the former or the latter cause, or whether they are produced by the animal system not assimilating with the abundance of earthy particles contained in our daily food, or whether they are likely to be deposited in the urinary bladder or in the mouth round the teeth; but it is certain that they are formed, and it is of much consequence to all to get rid of them as soon as they become visible, and thus prevent their accumulation.*

Hunter says,† "the animal fluids, when out of the course of the general circulation, especially when they stagnate in cavities, are apt to deposit an absorbent earth, and form concretions. This earth is sometimes contained in the fluids, and is only deposited as in the formation of the stone in the urinary passages. In some cases, perhaps, the fluids undergo a change, by which the earth is first formed, and afterwards deposited."

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* "When the disgusting effects of its accumulation are considered, it would appear impossible that any persuasion could be necessary to induce persons to obviate so great a nuisance, even on their own account, or if they are too debased to procure their own comfort and cleanliness at the expence of a very little care and trouble, they surely have no right to shock the senses of others, who possess more delicacy and propriety of feeling than themselves; yet so it is, and the sight and the smell are alike constantly outraged by the filthiness of people, who seem to obtrude their faces the closer in proportion to the disgust which they occasion"—*T. Bell on the Teeth*, p. 199.

† Hunter's Natural History of the Human Teeth, p. 125.

Fourcroy[*] states, "those very frequent incrustations which surround the base of the teeth, and are known by the name of tartar, which loosen and repel them, destroy the gums, and sometimes become so considerable that they separate and displace the teeth themselves, in some individuals who take no care of their mouths, are composed of *phosphate of lime* and a kind of *animal mucilage.* The saliva and the other juices of the mouth which incessantly bathe these bones, and remain between the margins of the gums and the teeth, gradually deposit upon them, by a real crystallization, particles of this earthy salt; and it is not to the residue of the aliments, as is commonly believed, that this pretended tartar of the teeth is to be attributed. The nature of this deposition upon the teeth is really phosphate of lime, mixed with a portion of mucoús and glareous substance; accordingly the acids dissolve it, as has long been known, by the employment of those substances adapted for cleaning the teeth; upon which, indeed, the acids act in a dangerous manner, if care be not taken to confine their operation merely to the layer of tartar which surrounds and covers them."

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[*] Fourcroy's General System of Chemistry, vol. ix. p. 449.

Magellan, who undoubtedly saw microscopic animalcula in the salivary calculus, thought that this concretion was a sort of nidus of polypusses formed by these animals.

Leuwenhook, who likewise discovered, by microscopic experiments, those animalcula, asserts, in his *Transactions Philosophique,*[*] that on examining a little fragment, of the size of a grain of sand, he calculated that it might contain 10,000 living creatures; and further states, that, although he always could discover them in the salivary calculus, he never could discover them in the saliva.[†]

Whatever may be the nature of those concretions, it is certain that they are the primary cause of the greatest mischief to and final loss of the teeth, though ever so slow in their formation. They commence on the inner side, round the neck of the lower front teeth, where they are deposited between the edge of the gum, and, as they increase in bulk by their own gravity, find their way downwards, where, in proportion to their increase betwixt the root of the tooth and the alveoli, they loosen and force it up; the gums become, through irritation, inflamed, spongy, and painful, until at last the teeth drop out, although still sound and healthy. Nor is this all, for whenever this tartarous mass is formed (being partly porous), it absorbs part of whatever is put in the mouth, and if the compound nature of the various aliments of made dishes, rich gravy, high game, sauces, pickles, onions, &c. &c. be considered, one may easily conceive what a chaos, or "compound of villanous smells," is produced from such a reservoir. Shame be on those who can thus debase themselves, and convert their mouths into a repository for offensive filth! How many young and beautiful faces have I seen spoiled and rendered disgusting through their own carelessness! You, mothers! to whom the care of youth is entrusted, surely, on you falls the blame. Set your sons and daughters the example; impress on their young minds the necessity of cleansing their mouths. Believe me, it is of the greatest importance, not only to themselves, but to their offspring, for it is not very unlikely that diseases of the mouth, as well as many other hereditary transmissions, may be inherited by their children.* This fact has, at times, led me to attribute to it the fearful increase of unhealthy and decayed teeth. It is really alarming to see the thousands and tens of thousands of young people, scarcely arrived at the age of puberty, with most of their teeth decayed or lost. Look at them, speak to them, and observe how they have their breath affected and tainted. It is extremely pitiable to have filthy irregular teeth, as a great many young people, whose parents (cruelly kind) have scrupled to submit them to a dental operation of a few minutes' continuance, but preferred to leave the unfortunate children victims to their reproachable weakness. With teeth buried in tartar, and blackened by decay, sooner than submit them to a momentary inspection or a trifling pain, they consign them to almost perpetual torture. Others, quite as reproachable, treat this subject with indifference, until the teeth are too far gone to have the evil successfully remedied. Parents and guardians are justly blamed as being the authors of an evil without remedy. Scores of young persons have consulted me regarding their teeth, and I have as many times heard them say, "my mother's tenderness has been the cause of this!" What a painful reproach to parents, who, but for their indifference or irresolution, might have averted from their offspring a punishment not far short of a curse.

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[*] Année 1684.

[†] "Ce qui prouve, comme mes expériences l'ont dèmontré, que la matiére tartareuse nést point un précipité, ou une espéce de cristallisation de cette humeur, ainsi que l'avoit dit le celébre Fourcroy"—*Serre's Anatomie des Dents,* p 33.

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* It is remarked by Burton, in his Anatomy of Melancholy, that "if a drunken man gets a child, it will, very likely, never have a good brain"—*T. Combe's Hereditary Transmissions of Complexions and Qualities*, p. 103.

But while excusing those young people whose misery and loss have been occasioned by the neglect of their parents and guardians, I cannot but reproach those who have arrived at a discretionary age, and still suffer their teeth to remain in a filthy state, loaded with black or yellow tartar, and emitting from their mouths, every time they are opened, an insufferable and loathsome stench. This is unpardonable and degrading, and is an offence against all social laws. "He who neglects his teeth, discovers by the omission a base and ignoble sentiment."*

Le Maire, in alluding to this subject, says, "gifted with reasoning qualities, how is it that one can neglect the envelope of the soul, that divine emanation, which seems to assimilate us with the Great Creator in resembling its essence: nothing ought to engage more our attention, nothing more our care. Those reproaches, however, fortunately, are not applicable in every thing, for great attention is paid to the curling of the hair, the beauty of the hands, the nails, and dress; but scarcely a thought is bestowed on the cleanliness of the mouth."†

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* Lavater's Essais sur la Physionomie.

† "On voit étinceler les diamans et briller les pierres précieuses

Man, who calls himself the lord of the creation, the master of all earthly creatures, is the only being who is guilty of neglect and carelessness in his teeth.

Surely nothing can be more simple or more easy than every morning to brush and rinse the mouth with water; but that, however, which might be sufficient for a child, would be insufficient for a person more advanced in years. To be accustomed, when a child, to pay attention to the mouth and clean the teeth, would be to form a habit for maturer years; and using an innocent active tooth powder* and brush every morning, and rinsing the mouth with lukewarm water, would, most likely, be sufficient; but they should, nevertheless, to preserve them in a clean and healthy state, be carefully examined by a dentist twice a year.

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au cou, aux bras d'une femme qui, très orgueilleuse de cette parure, ne rougit pas que chacune de ses dents soit un morceau d'ardoise. Des doigts de telle autre jaillissent des étincelles que l'œil à peine peut fixer; les rubis, les émeraudes, les coraux, les saphirs, les turquoises, les opales, forment sur son front un riche diadème, tandis que deux demi-cercles de tartre jaune ornent sa bouche. Quel contraste entre le peigne d'or surmonté de perles qui retient ses cheveux et les deux rangs de gencives livides—servant de sertissures à des dents qui vacillent à chaque mouvement de la langue! On songe à enrichir le joaillier dont le brillant mais inutile ouvrage donne une grande importance; à peine sait-on la demeure du dentiste"—*Le Chevalier le Maire, le Dentiste des Dames*, p. 193.

* I shall speak of tooth powders in the appendix to this work.

CARIOUS TEETH.

CARIOUS TEETH,

FREQUENTLY called decayed, rotten, gangrenous, &c. Whatever name is applied, it means a diseased tooth, which, from some cause or other, wastes, moulders, and gives pain, and which nothing but extraction can radically remove.

The cause of this decay has been a matter for different opinions among the professors of the healing art, though we may reasonably suppose that it proceeds, in the first instance, from a chemical action upon those bones, and next, perhaps, that it may be communicated by hereditary transmission.

The decay of a tooth will always take place on that part of its surface that projects out of the gum, before it is communicated to those parts within, and generally on such parts as are, by their formation, so shaped as to contain and retain lodgments of particles of food or moisture, which, by a chemical action upon the enamel, cause decomposition to take place.

It is also produced by two or more teeth being too closely in contact, by which certain small particles of food, once forced between them, are retained, and communicate, by their decomposition, the action upon their surface: that one decayed tooth can and does impart the decay to another in contact with it, is known to every dentist. Even the first or primary teeth, if decayed and suffered to remain in the mouth, will communicate the decay to those permanent ones that are as yet concealed in the alveoli.

Blake,[*] who understood his profession well, and had a great deal of experience, says, "it is the opinion of many celebrated anatomists, that diseases of the temporary teeth cannot injure the permanent, even though the diseased parts were to come into contact with them. I am sorry to say I have seen many instances of the contrary; though, previous to my having observed the connecting membranes, I was totally at a loss how to account for the injuries communicated from one to the other. The following case, which occurred to me about six years ago, in this city, will illustrate the subject remarkably well:—A lady brought a child to me, about six years old, to have the anterior temporary grinder of the under jaw taken out; the tooth was very much diseased, and the point of one of the roots stuck out of the jaw, and occasioned an ulceration of the cheek. On inspecting the mouth, I found the tooth quite loose, and a considerable portion of the alveolar processes attached to it, which had been separated from the neighbouring or sound parts. I removed the entire with a curved probe, and having immersed the extracted portion in water, in order to examine it, I found it to consist of the entire socket of the temporary tooth, and also the socket in which the bicuspis was forming, part of the body of which was tolerably advanced; the earthy matter of the 'cortex striatus' was quite black and perfectly soft, the sockets of the neighbouring teeth fortunately were not much injured. On inquiring into the history of this case, I was told that about two years previous the child had had a slight fit of the tooth-ache, which subsided, and soon after a gum-boil was formed, which frequently suppurated and burst, after which the child would get relief for some short interval. The mother, through timidity or false affection for the child, could not be prevailed on to consult any one, until forced to it by the consequences already mentioned; the child, without any other assistance, got well, but the jaw remains very much contracted where the tooth was, with a corresponding hollow in the cheek. I have, since that period, met with three or four cases where two or three of the permanent teeth were sloughed off by a similar cause. These cases I account remarkably instructive, for they clearly point out the necessity of removing the temporary teeth, when any such ulcerations or gum-boils are forming, particularly if they are of great extent or long continued. Slight cases, however, if properly attended to, might be retarded, and probably entirely checked."

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[*] Blake's Essay on the Structure and Formation of Teeth in Man, p. 75.

The opinion advanced by a few authors, that the teeth may be affected by caries commencing from within, as well as from without, has little or no proof to account for such an occurrence;* whereas the other has proofs in abundance to support the reality.

The decay, as has been stated, mostly takes place in the crowns of the grinders, and in such as, by their formation, have spaces, or hollow pitted surfaces, where the particles of food and moisture are retained and undergo decomposition, affecting the enamel. The front teeth very seldom decay, except at their sides, which is occasioned by their being too closely pressed against each other.† On the first appearance of the

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[*] Among the many thousands of human teeth which I have had occasion to cut or saw through, previous to mounting them on plates, I have never found one which could give me the slightest proof of such an occurrence.

[†] "Were it possible to keep every part of a tooth at all times perfectly clean, it is presumed that decay would be as slow to commence

decay, it will be observed to assume a darkened, black, or brownish speck, caused, if not by chemical decomposition, by lateral pressure, by injuring or breaking, in mastication, part of the enamel, by a blow, a fall, the cracking of a nut, or by the scratch of a pin in using it as a tooth-pick. However trifling such accidents may at first appear, they will all cause a cavity between two teeth, or in the crown of a tooth, sufficient to retain food and saliva, the lodgment of a caraway seed, a gooseberry seed, or a small part of the sinew of meat. The biting of thread between the front teeth, thereby breaking part of their edge, or splitting them all through, and the use of various medicines containing acids or calomel, will also cause decay, which is accelerated by want of cleanliness in not using the brush to remove the accumulated matter from its lodgment. After the first appearance of the dark speck mentioned, the decay goes on gradually increasing until the enamel is dissolved, when it commences with a more rapid progress upon the bony structure of the tooth, which, being of a softer nature than the enamel, is more quickly

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in the hollow as in the prominent parts. The reason why this species of decay seldom appears in front teeth, is, that they have but single-pointed wedge-like shapes, on whose surfaces few indentations exist, as in the double teeth, for the lodgment and decomposition of food and moisture."—*Paterson Clarke.*

acted upon. The decay thus goes on, the cavity is constantly filled by parts of food and saliva assisting the decaying process, the breath becomes fetid, and when at last the cavity becomes excavated to its full depth, the nerves become exposed, and the sensation of pain is felt, the nerves being the conductors of all sensation. Whatever is taken in at the mouth, whether hot or cold, and the least draught or gush of air, augments the distracting pain. The tooth-ache being once established, quackeries, nostrums, and strong narcotics are resorted to as *panaceas*, the use of which entails upon the sufferer mischief and disease. Tobacco smoke, henbane, the essential oil of cloves, thyme, and cajeput, camphor and opium, are of the favoured class of recipes; but what is the result of their application? Injuries without end! Sometimes a magnet is worn round the neck, and at other times electricity is employed, just as if the pain could be attracted by the one or expelled by the other! Next come cements and mineral acids; then cauterization, and the dentist's drill to destroy the nerve, or an incision, or the dividing of one of the superior or inferior maxillary branches of the *par trigeminum*, or fifth pair of nerves. And more recently we have had recommended iodine, tartar ammonia, creosote, prussic acid, and nitrate of silver, all of which are introduced into the cavity of the deceased tooth, on lint, by means of a probe. Most of these boasted remedies are fallacious, as their application is followed by severe inflammation and increased pain; and even the best of them give but temporary alleviation, for the tooth must, after all, be extracted before permanent relief can be obtained.

Teeth thus affected, if not removed, will communicate their disease to those next to them. Though this has been doubted by many, it is a fact but too well established. Even bony substances and artificial animal teeth, when in contact with or contiguous to carious teeth, will become carious and excavated in the same manner as human teeth.

Through neglect in not attending to the teeth when thus attacked, the decay or disease spreads and assumes a chronic appearance, which, it appears to me, may, if allowed to progress, become hereditary, and be transmitted from one generation to another. This is, probably, the reason why so many are subjected to an early loss of their teeth.

The manner of living, and the injurious qualities of the food taken into the stomach, have great influence upon the teeth. Where an individual is in the habit of eating (five, six, or more times in a day), quantities of animal food, much fat, rich made up dishes, white bread (perhaps adulterated with pernicious substances, such as alum, lime, or chalk), brown crusted pies, puddings with sugar, plums, currants, raisins, nuts, toasted cheese, unripe fruit, &c. which would require the stomach of an ostrich to digest, surely the animal economy will be greatly deranged, the digestive organs become weak in proportion, costiveness follow, and the exhalations from the undigested food find their way upwards. Hence a foul and hot breath: and the effluvia is allowed to settle and lodge upon the already loaded surfaces of the teeth.* If to this be added (which is frequently the case), an indolent life, with little or no exertion, illness, with all its consequences, will be the result. Conceive a female, in a state of pregnancy, thus situated, what, I ask, can possibly be expected as regards the state of health of her offspring? The teeth under formation partaking of the state of the health of the body, surely must be similarly affected.

Decayed teeth often occasion most distressing and fatal diseases, as phthisis pulmonalis, dyspepsia, pain in the ear, and formation of matter in that organ, inflammation and painful affections of the eyes, in some cases producing almost total blindness, nervous affections, epilepsy, rheumatic affections, tic douloureux, &c. &c. The surrounding soft parts of the diseased tooth become engorged, the inflammation spreads over the adjoining parts, throbbing and pulsation, with violent pain, are felt, with symptoms of the formation of an abscess, accompanied with head-ache and fever, until at last the abscess is formed, breaks, and the collected pus forces for itself an outlet. Sometimes the abscess will break under the chin, or out at the cheek, and leave a disfiguration for ever after; but if the collected matter or pus should be discharged, the patient will only have relief until, from some irritating cause, the parts become again affected, and nothing but the removal of the offending tooth can produce actual relief.

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* "Decay of the teeth is often the consequence of certain states of the constitution, in which the functions of the body are performed irregularly, inducing various dyspeptic symptoms"—*Mr. Fox.*

PROTRACTED INFLAMMATION.

PROTRACTED INFLAMMATION PRODUCING FUNGOUS GROWTH.

If a decayed tooth be suffered to remain in its position, it will cause a sensation similarly painful to that occasioned by a thorn, a bullet, or any other foreign substance introduced into the tender or fleshy parts of the body, and, unless removed, the irritation will produce high inflammation in the adjoining parts. The diseased tooth will communicate its inflammation to the lining of the socket, or alveoli, as well as to the surrounding parts of the gum; the lining of the socket, or periosteum, with its whole tissue of minute ramification of blood vessels and nerves, will become swollen, inflamed, and exceedingly painful; the tooth will be partially raised by the increased thickening of the inflamed periosteum; the circulation of those little blood vessels being arrested or totally stopped, the consequence will be an engorgement, or a sanguineous accumulation, and the result will be, that, like a diseased bulbous root, instead of throwing its strength and vivifying principle into the stem that ought to bring forth the flower or fruit, it will throw off branches or buds to produce a secondary formation of indifferent growth: thus fibres will be formed, thrown off, shoot, and grow in fungous masses from the diseased parts, and assume, in most cases, a serious aspect.

Teeth that are extracted at the early formation of this disease will be covered with detached yellow watery vesicles or pustules, as may be seen plate II. fig. 4, 5.

The greatest inflammation will be visible round or at the points of the roots, and in proportion to the inflamed state, the pustules will be more or less in size and substance. In aggravated cases these pustules soon become one mass, or growth, when they throw off numerous minute fibres, and increase rapidly in their progress. See plate II. fig. 6.

At this period the pains become so violent and distressing, accompanied with head-ache and fever, that the patient can bear it no longer, and is obliged to submit to the operation of extraction for relief. Were it otherwise, the increasing fungous or cancerous growth would spread through all the adjoining soft parts of the mouth; or if in the upper jaw, find its way through the palate, antrum, and nasal portions. To any medical or practical dentist, even of the least pretensions, the case would at once point out the necessity of the removal of the tooth, at the same time reducing the inflammatory symptoms by purges, and astringent and anodyne lotions ;* after which tonic medicines might be used with great advantage, according as the case might require.

Those fungous growths of the teeth are generally very much alike, with some exceptions. During my practice in Liverpool, a few years ago, a sailor called on me, with his left jaw swollen, greatly inflamed, and the cheek hanging almost three inches lower down than that on the right side. On examining his mouth, which could scarcely be opened, I found the gums, palate, and tongue greatly inflamed, and on applying pressure to the irritated parts, a great deal of mucous was dislodged, giving the poor fellow, at the same time, the most excruciating lancing pains. The tooth, a second molaris of the lower jaw, which was the cause of all this, was much decayed, almost buried in the surrounding inflamed parts of the gum, and quite loose, but on the slightest touch the patient roared like a madman. However, I got hold of the tooth with a pair of curved forceps, and it yielded without the least exertion, but on its appearance I was startled by seeing a fungous growth, attached to and round the fangs, more than an inch and a quarter long, and resembling in shape a bundle of red feathers. See plate II. fig 7. When the tooth was extracted the patient fainted, after which he felt, as he told me, such agonizing pain, that had he had the means of destroying himself at the moment, he would have done so in preference to submitting to the pain he experienced. After dressing the mouth and using the necessary applications before mentioned, it took nearly three weeks to restore him to perfect health.

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* For various lotions see appendix.

INFLAMED AND SPONGY GUMS.

INFLAMED AND SPONGY GUMS.

Common inflammation and spongy gums (very often wrongly called scurvy), are a disease which (nine times in ten) is brought on or occasioned by downright neglect, in not using the tooth brush, to remove accumulated particles from between the necks of the teeth and the edges of the gums. It begins by a slight swelling and redness of the gums, which become tender, and bleed on the slightest impression, and is often attended with a peculiarly gnawing and unpleasant sensation in them, and about the necks of the teeth. It is occasioned by the tartar of the teeth, which is deposited around their necks, pressing upon the sockets, which induces pain, inflammation, and very often suppuration; and unless cured, occasions the loss of the teeth. In proportion as the gums become tender, the less attention is often paid to them, for it generally happens that the tooth brush, thitherto in common use, is then completely laid aside, because the gums are too tender to bear the friction. It is surprising how rapidly this disease, though trifling at the onset, will spread, if not attended to in time.

The treatment in this disease is simple, the removal of the accumulation from between the gums and the teeth being all that is required; after which the gums, as well as the teeth, must be well cleansed with a tooth brush (the hardness of which must depend upon the state of the gums), dipped in a powder composed of pulverised Peruvian bark and myrrh, mixed with a little pulverised cloves. This of itself, in most cases, will be sufficient to cause the gums to bleed freely, but if not, they must be scarified to cause a degorgement of the overloaded blood vessels; and afterwards the mouth should be rinsed with a wash, composed of the tinctures of myrrh, bark, benzoin, catechu, and rose water, in strength as may be required (see appendix). This treatment alone, with attention and cleanliness, will effect a perfect cure; but let it be understood, that where the gums are inflamed, and the spongyness is occasioned by scrofulous or scorbutic affections arising from a deranged state of the animal functions, the case will require other remedies in addition to the simple rules here mentioned, as the curative applications to the mouth would be unavailing without a medical treatment applicable to the affected organs and the originating causes.

OPERATIVE DENTISTRY.

SCALING OF THE TEETH.

The principal parts of operative dentistry, as practised by the generality of dentists, consist of scaling the teeth, lancing and scarifying the gums, plugging or stopping carious teeth, filing or dividing their uneven edges, and extracting them.

The first of these operations, though very simple in the execution, still requires practical experience, and some judgment. The operation is intended to remove, by instruments made for that purpose (and which may be obtained from any surgical instrument-maker), the concreted accumulations of tartar. In most cases two or three of those instruments will be sufficient. They are generally in cases from six to a dozen in number, and are shaped spear-like, square, triangular, pointed right and left. They ought to be made of hard well tempered steel, and so constructed that they may be applied in every interstice and cavity round and between the teeth, so as to remove the calcareous tartar which is lodged on or round the necks of the teeth. The dentist who takes a pride in his profession, will have a great number of those scaling instruments, of different shapes and sizes, and will have them made, or if he is a mechanic himself, construct them, according to his own judgment, as the instruments bought in made up cases are generally too soft and blunt, or too weak, to be used with advantage.

After the mouth has been well brushed with an active tooth powder, and rinsed, the operator should be provided with a little speculum, which will, on holding it behind the teeth, by its reflection, show parts loaded with the tartarous concretions; after which the operator, standing behind or in front of the patient, has to use his little scrapers (the triangular will, in most cases, be of the greatest use), and, by little and little fragments, dislodge the calcareous mass from its hold, every now and then brushing and rinsing the teeth, until, by repeated scraping, brushing, and rinsing, all particles are removed. Particular care should be taken not to leave even the smallest speck of tartar, for if left, it becomes a nucleus for other layers to settle upon, and in a short time the teeth will be in the same state as they were at the commencement of the operation. The smaller particles between the teeth, or specks on them, if the instruments will not remove them, may be disposed of by a little flat or round spatula of soft wood, cut or shaped to match the spot that is to be acted upon, moistened and dipped in fine pulverized pumice-stone, and applied with judgment to the speck or taint; this will be found to work admirably.

The use of acids in the removal of tartar should always be avoided, unless in those cases where a discoloration of the enamel has taken place, and even then it will require the hand of an experienced operator to prevent the mischievous consequences that might follow. When used it should be applied with a fine hair pencil, and the mouth well rinsed and washed immediately afterwards, so as to prevent the diluted muriatic acid from acting upon the surface of the enamel of the tooth operated upon. I repeat again, none but the experienced dentist alone should meddle with chemical means to dislodge stains or discolorations of the teeth, as the shaking hand of a bungler (and there are a great many of them in the profession) would spill drops of acid upon the dress of his patient, burn his mouth, or give him a coughing fit for an hour, and cause him to repent of ever having trusted himself to such an operator.

In many instances the tartar has been allowed to deposit itself for years, until it has accumulated to the enormous size of six times the bulk of the tooth, or to such a degree that the front teeth of the lower jaw have been completely buried in it. I have several teeth of this description in my collection, round one of which the tartar is six or seven times the weight of the tooth itself. I have also three front teeth, which dropped out of a patient's mouth, completely cemented together by the tartar, and ten times the thickness of the teeth that are cemented by it. In such cases the teeth are chiefly kept in their sockets by the encrustation of the calcareous mass, and if this concretion were removed at once, the teeth would have no support, but would immediately fall into the mouth; therefore, when scaling is required by individuals who have thus far neglected their teeth, the tartar can only be removed by several renewed and careful operations.

FILING OF THE TEETH.

The use of the file in equalizing the teeth is frequently more abused than would be supposed, particularly in the hands of an inexperienced operator. Whenever the teeth are too closely wedged together, or lap over, then the file may, and, indeed, ought to be used to divide them, so as to separate them, and avoid the disproportionate pressure on their lateral sides. For this purpose small flat files, known by the name of dental files, may be had in parcels of a dozen, at any of the surgical instrument-makers. The best in this country are made in Lancashire, of different sizes, right and left. For my own part, I always use the French files in preference, as they are more even, finer cut, and better tempered. The thinness of those files, so required that they may be used with advantage between the teeth (generally between the front teeth), renders them liable to be frequently broken. To avoid this occurrence, and to be enabled to use them with that steadiness and precision which is necessary, a little instrument has been introduced, in which one of those thin files is to be fixed, and both ends held in a slit and screwed firm; by this means the file can be used evenly and steadily, without the least chance of breaking. It is almost needless to mention, that some of those files are cut or toothed only on one side, so that the cutting side may be applied to that part of the tooth that requires it.

It will be frequently found, in children from seven to ten or twelve years old, that the edges of the teeth are very uneven, sometimes so much so that they have the appearance of a saw. In this case a stronger file, of a different shape to the one mentioned, is required to remove those points, which should never be done all at once, but by little and little, and at intervals of a few days.

It is to be remembered, that the enamel, which is the protection of the tooth, and which will be found to be thickest and strongest on the upper edges of the tooth, and thinner and less as it approaches the neck, should, in filing, always be treated with due judgment; that is, never to file so as to cause the total removal of it, but to leave sufficient to protect the bony structure of the tooth. The same precaution will be required in removing the commencement of caries, which appears in brown or black specks on the side or between the teeth; and let it be understood, that when a file is used to remove those specks or discolorations, after filing, a wooden spatula, with finely powdered pumice-stone, should be used to smoothen the filed surface, after which a hard tempered burnisher should be applied to that part from which the discoloration has been removed, to render it even, smooth, and polished, like the tooth itself. If this part of the operation be neglected, the filed surface will be liable to become again affected, and will then be as bad (if not worse) as it was before the operation.

Let the inexperienced operator or young practitioner take care how he uses the file, as on a judicious treatment his success will depend; whereas from an oversight in those particulars, the most serious consequences may be anticipated.

A dentist, not many miles from this place, and who has no small opinion of his professional acquirements, attended in his capacity a boarding school of young ladies: one of them had her teeth, though good and healthy, rather uneven. When this dentist, to improve, as he thought, their appearance, set about filing the four incisors of the upper jaw—and file he did, until the teeth were even, sure enough; but all the enamel was filed away, the bony structure laid bare, and exposed to the air, to hot, cold, and to every thing that was taken in the mouth. The consequence was, that in a few weeks the poor girl became affected with a tenderness in the upper jaw, shooting pains up to the "ala nasi," the nasal cavity and sinuses connected with it, up to the septum, whenever the least draught of air or breath was taken in the mouth. As the filed teeth became decayed, the pains increased to such a degree that the young lady became an invalid, and kept her room; her parents and medical adviser thought she was in a decline. She was in this state when I first saw her, about a year after the filing operation. When I examined her mouth, I found the two front incisors completely decayed and truncated. I removed three of the incisors, which gave immediate and perfect ease, and without further assistance, in a week's time she was completely restored to health. I took afterwards a cast of the mouth, and constructed three mineral artificial teeth, which she has worn with perfect ease for the last six years.

STOPPING OR PLUGGING OF TEETH.

It is generally admitted that the decay, or caries, commences at the external surface of the teeth, whether occasioned by constitutional or hereditary diseases, or by acrid depositions upon the surfaces, which, by a careless neglect, are suffered to remain and progress until a cavity is formed (through chemical action upon the particles of food thus deposited) by their decomposition.

By the late microscopic experiments of *Professor Retzius* of Stockholm, so ably described by *Alexander Nasmyth* in his well written work on the teeth, it is proved that the teeth are a compact formation of transparent ramifying tubes, of which the trunks open into the cavity of the tooth, supporting themselves on its pulp, whilst their terminations, in the form of extremely fine branches, run towards the external surface of the tooth. Under reflected light, and on a dark ground, all these tubes seemed to contain a white matter.*

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* This being the case, may we not suppose (those tubes being liable to contract or expand, according to the different degrees of temperature)

The old French adage, "*Prendre un verre de vin après sa soupe, c'est enlever un écu de la bourse de son médicin, et mettre six francs dans la poche de son dentiste,*" expresses more in a few words than could be well communicated in social conversation.

But as this chapter is intended to acquaint the reader with the operation of plugging, I will proceed accordingly.

Stopping the cavities of decayed teeth is, perhaps, one of the earliest operations in dental science on record. Various substances have been and are used for this

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that the various substances put in the mouth, viz. hot broth, coffee, tea, cold drinks and ices, may, through the sudden transitions from the one to the other, be one of the chief causes of diseased teeth?

Professor Retzius first examined the cartilage in teeth which had been macerated in diluted muriatic acid, and found, on making sections of it, that it appeared to consist of slightly undulating fibres, lying close together, resting with one extremity against the cavity of the pulp, whilst the other terminated near the surface of the tooth. It was not till a subsequent period, he says, that he discovered that these were hollow; but in the mean time he observed no internal similarity between this cartilage and that of bone—*Nasmyth's Structure of the Teeth*, p. 49.

Leuwenhook was acquainted with this tubular system of the teeth. In his Philosophical Transactions for 1678, he says, "Having drawn out one of my teeth, and, for further observations, applied better glasses than the former, we plainly saw, that the whole tooth was made up of very small, straight, and transparent pipes. Six or seven hundred of these pipes put together, I judge, exceed not the thickness of one hair of a man's beard"—*Idem*, p. 8, 9.

purpose. The essential point, however, is to introduce a stopping or plugging into the cavity, so as to render the tooth solid: such substance should be free from corrosion or oxydation. The operation, though not a difficult one, is a very nice one, and if well done, will last for many years. For this purpose, however, the tooth intended to be stopped should be attended to before the cavity becomes too large, and before any symptom of pain is felt. Unfortunately, little attention is paid to this most essential point, for the dentist is seldom called upon until the tooth has commenced aching. Persons who are cleanly in their habits, and have their teeth examined once or twice a year by a skilful operator, will find the benefit of the precaution, for nothing is more easy than, on the first appearance of a cavity sufficiently large to contain a stopping, to stop it with effectual and permanent success. For this purpose instruments are used, which may be obtained at all surgical instrument-makers. They consist of cutters, stoppers, borers, and burnishers; though the experienced dentist will add, or make for himself, such additional instruments, of various shapes, as his ingenuity and practice may point out to him. Whenever a tooth is too much decayed, the nerves exposed, or feels sore on the slightest touch or pressure, such a tooth is unfit for stopping (at least with gold leaf), for in filling it, ten to one but the pain will increase to such a degree, that nothing but the removal of the stopping, or the extraction of the offender, will give relief.

Whereas, when the cavity can be pressed and scraped without giving pain, such a tooth can be stopped with safety, and will last for years. I have known persons who have had their teeth stopped ten, twenty, and thirty years; but in all these instances, virgin gold was used.

In stopping a decayed tooth, the cavity is cleaned and scraped, so as to remove all decayed and soft parts, cutting or scraping, at the same time, an edge or groove under the enamel on its sides, so as to produce room for a countersinking of the stopping. Next, the cavity is perfectly cleaned and dried with cotton or lint, (in France small bits of sponge are used); next the gold leaf is cut in a strip sufficiently large (always more than will be required) to fill the cavity, so as to avoid putting a second piece in the tooth, for if one piece be put upon another, it never can be a lasting operation. The gold is to be pure, and pressed close and firm in the cavity under the edge, so as to be even and smooth with the surface of the tooth; after this it is to be burnished with an instrument having a rounded head, so as to leave the stopping polished, and smooth to the tongue. This being properly done, particles of food, saliva, &c. are perfectly excluded, and the operation will be found effectual and satisfactory, particularly if performed on the back grinders, or on such teeth or such cavities as cannot be observed when the mouth is opened.

In many persons, however, the front teeth are liable to decay, and not unfrequently on the surfaces always exposed when the mouth is opened. Such teeth persons object to have stopped with gold (though the best of all stoppings) on account of its being perceived. At times the decay being betwixt the front or lateral incisors, perhaps on the thinnest edge, where gold cannot be introduced without risk of breaking the tooth, I have used a stopping made of powdered quicklime and Canada balsam, mixed into a thick paste, and after the cavity has been perfectly dried, this paste is to be quickly pressed into the tooth with a silver spatula, and smoothened. This is a very pleasant though not a lasting stopping, but may be repeated whenever occasion requires it; but let it be borne in mind, that the only safe, uncorroding, and permanent stopping for decayed teeth is virgin gold. Nothing has as yet been discovered, or, perhaps, ever will be, surpassing or equalling the plugging or stopping with gold. Platina, however, on account of its unoxydising qualities, may be used with advantage.

Modern inventors, however, have introduced a variety of stoppings, some of which may be adopted when gold cannot be properly used. Their use must be left to the judgment of the operator: but if he understands his profession well, he will never introduce amalgams or compounded minerals.

Lead leaf, at an early period, was frequently used, on account of its ductility and the ease with which it could be compressed into the cavity of a tooth; but the acidity of the saliva, or certain liquids taken in the mouth, causing an oxydation of a poisonous nature upon that metal, it is now rejected.

Tinfoil, greatly used by some American dentists, is but little better.

Mineral succedaneum, if composed of silver and quicksilver, becomes soon hardened, while the mercury becomes absorbed in the system, which, in some constitutions, is liable to produce symptoms of salivation.

Fusible metal, a composition of lead, zinc, and bismuth, in equal parts, becomes fusible by being touched with hot iron.

Terro metallic cement, composed of three parts of sulphate of lime and one part of the rust of iron, is put into the tooth in a paste-like consistence, and soon hardens.

Anodyne cement, a similar compound to the above, only a little acetate of morphine is introduced into the cavity previous to putting in the cement.

These are but a few of the many stoppings that are vaunted by their bombastic possessors, claiming superiority to impose upon the unwary. But wherever the patient employs a respectable well informed dentist, he will be certain to meet disinterested scientific treatment.

But every age has its novelties of quackery, and numbers are always found ready to lend themselves to imposition. What would a well instructed dentist of the present day say, were he taught "to extract a tooth, then to file off any diseased part of it, and immediately to replace it?"

Or, "if a tooth becomes so hollow as to give way, whereby the passage becomes too large to keep in any of the stopping, and a part of the body of the tooth still stands, then a small hole may be drilled through this part, and after the cavity has been well stopped, a peg may be put into the hole, so as to keep in the lead, gold, &c. &c."

Or, "to extract a decayed tooth, to boil it, and return it to its socket."

Yet these were the instructions of the "Great Physiologist and Surgeon" of the eighteenth century.

It is very injudicious to have teeth stopped with stoppings of different metallic substances, and by different operators, if it can be avoided. Every one has heard of, or tried, the experiment of placing silver on the top and zinc under the tongue, and making the edges touch, to produce the metallic taste caused by the galvanic action of the metals. Even so is a galvanic action kept up in the mouth, when more than one kind of metal is used in filling the teeth. A lady of this town, a patient of mine, had several back grinders stopped with gold for many years; being on a visit in London, one of those teeth, in biting a piece of crust, broke part of its edge, and caused the stopping to yield and drop out. She had this cavity stopped afresh with fusible metal, but whenever the mouth was shut, she complained of experiencing an alkaline taste, which she attributed to a derangement of the digestive organs. On her return from London, she came to consult me, when, examining her mouth, I at once told her the cause, and convinced her of my opinion, for on covering the plugging of the fusible metal (an amalgam of bismuth, lead, and zinc) with a layer of wax, she was perfectly free from experiencing any taste whatever, nor did she afterwards, when I had removed the metallic stopping, and put gold in its place.

Thomas Hare, in a work published in 1820, mentions a case, and says, "where a faulty tooth in the upper jaw had been stopped from its side with tinfoil, the interstice between it and the adjoining tooth being quite inconsiderable, while the upper surface of a tooth, not immediately beneath it, in the lower jaw, was stopped with the same metal, I have known a galvanic shock regularly communicated from one to the other, whenever by any accidental movement of the mouth they came within a certain distance of each other, probably about half an inch."

L. Mackall, of Baltimore,* states a case and says, "The most distinctly marked case of galvanism in the mouth I ever met with was in a lady, on whose tooth I recently operated. I had filled several with tin for her two or three years previous, and upon examination I found the teeth had again decayed around the plugs, making it necessary to refill the cavities. While cleaning one of them out she complained of much pain, which I attributed to inflammation of the bony structure only. When, however, I commenced refilling it, the pain became so violent that I could not proceed, and, upon trial, I found that, by holding the instrument an inch or more from the tooth, I could at pleasure give her a violent galvanic shock. I filed the handle of a tooth-brush to a suitable shape, and filled the tooth readily, without the slightest uneasiness. At the time, and even a week after, when a silver or steel instrument was held the same distance from the tooth, the same effects were produced. I observed that the exhalation of the breath increased the evolution of galvanism. If the patient kept her mouth open wide and held her breath, the instrument might be brought nearly in contact with the plug without producing any effect. In conclusion I may add, that these facts show how unscientific and injurious it must be to fill cavities with such 'amalgams' and 'pastes' as are sometimes strongly recommended by certificates from physicians, published by some dentists in the newspapers."

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* American Journal of Dental Science, Vol 1, No. iv. p. 87.

In cases where the tooth is tender and not able to bear the pressure necessary to render the gold firm and solid, a paste-like composition may be substituted. Previously, however, to filling the tooth, I always introduce into the cavity a small hair pencil, dipped in a solution of nitrate of silver, and then properly dry it with a bit of lint. Some dentists, before they stop a decayed tooth, will put a little morphine in the cavity. For my part, I have found the solution of nitrate of silver answer so well that I never use any other.

Spooner,* in his Treatise on the Teeth, recommends a mixture of equal parts of white oxide of arsenic and morphine, made into a paste with six times their bulk of conserve of roses, as a perfect remedy to destroy the sensibility of tender teeth and their nerves. Great care should be taken to secure it in the cavity and prevent its absorption by the fluids of the mouth.

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* Of New York.

EXTRACTION OF THE TEETH.

THE operation of extracting teeth, to do it well, can only be acquired by much practice, and a thorough knowledge of the dental arcades and alveolar processes.

It is true this operation is performed (and frequently pretty successfully) by a great many persons totally unacquainted with the anatomical parts or structure of the teeth, or with the consequences that may happen from an unsuccessful extraction. I have known many surgeons, and even experienced dentists, who disliked this operation, simple as it is (though, in fact, it is the dislocation of the most firmly united bones), and to some it is almost as disagreeable as to the patient himself.

If a tooth is to be extracted, which should never be done unless all chance of saving it is past, the patient should be somewhat particular in choosing the operator. What mangling, lacerating, and torture are occasioned by a bungler of an operator! Extracting of sound teeth in mistake for decayed ones, the alveolar processes greatly injured, or parts of the inner plate torn away. I saw, in Birmingham, an instance of a poor fellow who wanted to have a tooth extracted (the first molaris on the left side of the lower jaw), when a young man, an apprentice, was entrusted to try his hand at it, and so well did he lay hold of the jaw, that, smack at once came out two teeth (molares), a strip of the inner plate of the alveolar process, and a part of the gum, nearly two inches in length. Two instances came under my observation, where part of the lower jaw was broken by the use of a too large and badly constructed claw and bolster of a key instrument.

Another operator, not many miles from where I am writing these pages, extracted a tooth from a healthy servant girl, when all of a sudden, a fourth night after the extraction, symptoms of a virulent syphilic disease manifested themselves. On inquiry it was found that, a few moments previous to the extraction of the tooth, the same instrument had been used to extract a tooth from an infected female, and through neglecting to wash and cleanse the instrument, the second patient got infected with the disease.

These are but a few accidents of the many I could state, but they will be sufficient to show cause, and put the uninformed reader on his guard.

The awkward position of having the patient's head between the operator's legs, when extracting a tooth, is frequently the cause of accidents, as it is the most unhandy (to say nothing of the indecent) posture that can possibly be chosen—the head of the operator hanging downwards to look into the mouth of the patient! It reminds me of looking for the beauties of the landscape with the head between one's legs. There is no necessity for this antiquated position, which seems to have originated with *Ambrose Paré,* who wrote in 1579, when he says, "For the better plucking out of the tooth, the patient shall be placed in a low seat, bending back his head between the tooth-drawer's legs, then the tooth-drawer shall deeply scarify about the tooth, &c. &c." And further on he says, "I would have a tooth-drawer expert and diligent in the use of such toothed mullets, for unless one know readily and cunningly how to use them, he can scarce so carry himself but that he will force out three teeth at once, often times leaving that untouched which caused the pain."

The notion of the ancients suspending a leaden forceps in the temple of Æsculapius, to remind the operators of that period that no teeth were to be extracted but such as would yield to a leaden instrument, was far from being ridiculous, and it would not be *mal ápropos,* if some bunglers of the present day had a similar one suspended before them, if it were only to remind them that force and violence are unnecessary, and should always be avoided.

The rules laid down by *Hunter* to extract or draw a tooth to that side where the alveolar process is weakest, which "is the inside in the two last grinders on each side of the lower jaw, and the outside in all the others," is generally adhered to by most operators; but notwithstanding the soundness of this laid down rule, there are frequent instances that will prevent the operator from following this injunction; for it is to be supposed that none but decayed teeth will be required to be extracted, and if the part of the outside is completely decayed, as is often the case, the tooth must be taken hold of as its state will admit; or if the roots happen to be curved to the opposite side, or diverging in contrary directions, the "key" or "forceps" must be employed in such a manner as to remove the tooth without giving unnecessary pain, and without mangling or tearing the adjacent parts. That dentist who looks at a molaris, or back grinder, and cannot tell by the formation of its crown (that is, if any of it is left) in which direction the root or fangs are situated, knows his business but imperfectly, and should the operation succeed, and the tooth come clean out of its socket, it is a mere matter of chance. It is true, as *Mr. Bell* justly remarks, in his admirably written work on the teeth, that "the pain is greatly diminished by a judicious choice and application of the instruments." Still, nothing but an extensive practice will make an expert operator.

Some thirty years ago, while in Amsterdam, I saw tooth-drawing performed, on fair-days, in the market-place, by a number of self-taught assuming mountebanks, mostly of the jewish tribe, in an open carriage, with steps on each side. Those men had acquired such expertness in extracting the teeth of the market people, who came in scores to have that operation performed, at the small expence of a "dubeltie" (two-pence), and, strange and incredulous as it may appear, I have frequently counted from thirty to forty, in an hour's time, who had their teeth extracted, and all apparently without any bad result. This tact surely was obtained by practice, for, with some of these operators, curiosity led me to have some conversation on the subject, and all of them were the most uninformed and ignorant men, in respect to a knowledge of the anatomy or diseases of the teeth, possibly to be met with.

A dentist in Philadelphia* has acquired such expertness that, it is stated, he removes a back grinder, no matter how, with his fingers, and wanted to persuade his brethren in the profession, of that country, that he had discovered a new ligament, which, by being cut through, the tooth may be removed without giving pain! This beats Æsculapius's leaden forceps hollow; or, as Paddy would say, "bangs Banagher!"* But such quackery is undeserving notice, and is looked upon by a sound practitioner with pity and contempt.

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* American Journal on Dental Science, Vol. 1, No. 1.

The instruments used for the extraction of teeth are many, and of various shapes and constructions. The chief object, however, is to use such instruments as will remove a tooth with facility, and at the same time avoid unnecessary pain. There can be no doubt but a practitioner may become so much used to an instrument (even of an inferior kind), that he would operate awkwardly were he to employ one of a superior construction. The best and surest way, then, for a beginner, would be to supply himself at the commencement with the best and most approved instruments that can be obtained.

The paces, or forceps, of different sizes, intended for the use of the extraction of the incisors, are constructed so that the tooth can be taken hold of with the points of the beaks only, when, with a slight rotary motion, the tooth is loosened, after which, instantly, without changing or loosing the instrument, a perpendicular force, sufficient to make the tooth quit its socket, is employed. Those forceps that have a long bill, and the points sufficiently sharpened so as to slide between the gum and the root of the tooth that is to be extracted, are preferable, as, without lancing the gum, the beak of the forceps can be pushed sufficiently up or down, along the tooth, to remove it with ease. The handles, too, should not be too strong, but have a degree of elasticity to avoid too strong a grip, so as to prevent the breaking of the tooth. The front incisors and canine teeth, having single cone or tapered roots, yield freely, and are the most easily extracted. The small grinders, or bicuspides, should be extracted with similar forceps, only stronger, and constructed so as to hold the crown just round its neck, and no more; and when taken hold of, no rotary motion whatever should be used, but a slight momentary pressure, forwards and backwards. When followed with a perpendicular pull, those teeth yield freely. It is to be remembered, that the roots of these teeth vary frequently, but have generally two roots united up to their points, or separated a little near the points; and occasionally they are separated or diverge a little, and being of a flatish shape, a rotary motion, in attempting to extract them, would only cause a laceration of the socket, or the breaking of their fangs.

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* Amongst many other marvellous accounts of tooth-drawing, it is related, somewhere in an Irish publication, of a fiery captain of the sister island, that when any of his company wanted a tooth extracted, he made them tie a string to the troublesome tooth, the end of which being fastened to a leaden bullet, put on a charge of a pistol, and, when fired, the tooth followed, but so rapidly that no pain whatever was experienced.

The molares or back grinders require a more attentive inspection before the application of the instrument is resorted to. Some operators have put the key instrument totally aside, and prefer crooked forceps in its place. For my own part, whether from use or old habit, I have always found the key instrument more advantageous than any other; nor have I, during all my practice, a few cases excepted (and then greatly against my inclination) ever used the forceps, unless at the particular request of my patient. For the removal of the two first molares, on each side of the upper and lower jaw, most key instruments are too large and clumsy, too powerfully constructed, as if they were intended to remove teeth from a horse's mouth. It does not require that great force which is applied by some, and which has, no doubt, in many instances, been the cause of inflicting miserable wounds on the gums and jaws of their patients: whoever is in the habit of using a key instrument is acquainted with the great power it possesses. No wonder, then, when this instrument is in the hand of an untutored operator, that so many accidents should happen. Pity on the unfortunate patient who, under such circumstances, has to submit to the operation. To use the key instrument with advantage, it ought to be well proportioned, the claw to move easy on its axis, and the bolster of sufficient breadth, but not too long, as is mostly the case. When the instrument is placed on the tooth, the fulcrum must be placed on the line where the gum joins the tooth, and the claw on the other side, down the neck of the tooth, so that the edge of the claw is about on a line with the lower extremity of the fulcrum; then, by a gradual turn of the hand, in an elevating or rising motion, and when feeling to yield, the tooth is, with an additional sudden twist, dislodged from its socket. I always lance the gums previous to extraction, notwithstanding the difference of opinion of some professors in dental surgery. It gives no pain, pacifies some patients, and causes the instrument to take hold of the tooth without tearing the gum.

The expert operator should have various claws, and of different sizes, as well as a few keys, and use those that exactly fit the tooth intended to be removed, and before the extraction takes place they should be tried and fitted to a nicety. If the operator has the instrument properly fixed, and finds, when a moderate force is applied, that there is no loosening or moving the tooth, he should desist, as he may anticipate a crooked diversion of the roots, or an ossification with the alveolar process has taken place, and the operation must be treated accordingly. Nor can this be looked upon as a failure; far from it, the patient will be benefitted by this prudence, and perhaps the mere reversion of the position of the instrument will make the operation succeed. If the roots of the teeth stood all alike in a perpendicular position, the operation would be always successful, and positive rules might be laid down how to proceed; but as there is a considerable variety in the formation of the roots of some teeth, the dentist must be guided by circumstances. As I have already stated, it is usual, according to *Hunter's* instructions, to extract the molaris to the outside of the jaw; and no objection can be had to this laid down rule, but wherever the roots are curved to the opposite side, such teeth will never come out clear, and either the roots will break, or the alveolar process be greatly injured. If a tooth stands in the socket with diverging roots or bend (see fig. 8. plate ii.) and the bolster resting on (*a*) and the claw on (*b*), and force be applied, nothing can prevent the breaking of either the roots or the alveolar process (*c*), or the key instrument itself. Whatever is weakest will yield; reverse the instrument and the tooth will tumble out, as it were, immediately.

Such teeth will be frequently met with, as well as others. I have several in my collection with the roots greatly enlarged at the fangs, by uneven and irregular protuberances.

The most expert operator cannot always avoid breaking a tooth, when it is brittle or hollowed out by decay, not being then able to sustain the necessary force to extract it. But he who meets with such an accident should remove the roots afterwards, unless objection be made by the patient. For the purpose of removing broken fangs, stump instruments, or elevators, are used, though, if possible, I would recommend narrow tapered forceps for that purpose, as I have known serious accidents occur by the use of spear-pointed elevators, by slipping from the fang, and being pushed through the cheek or palate. If an elevator is to be used, I would give the preference to the one shaped (see fig. 9, plate II); it can be used on either side, and by placing the forefinger inside or outside the bend (*a*) no accident from slipping, or running through the cheek or palate, can possibly happen.

For the removal of the *dentes sapientiæ*, curved forceps will answer very well: they should be removed inwardly.

It will be seen from the foregoing observations, that the extracting of teeth is not such a trifling operation as might be supposed, but that sometimes it is dangerous to extract a tooth, as it frequently happens that the patient mistakes a constitutional case for a local one, and then the advice of the physician, or surgeon dentist, would be infinitely of more service than the mechanical skill of the tooth-drawer. It is not sufficient that the dentist knows how to scale the teeth, extract, or plug, but he must be acquainted with their morbid diseases and anatomical construction.

Tooth-ache is frequently the result of gestation, or is produced by a deranged state of the digestive organs, when, in fact, constitutional remedies alone will tranquilize the affected parts of the mouth. Numbers of patients have made application to me, complaining of tooth-ache and tenderness of the gums, some even insisting on the extraction of a supposed affected tooth. When, on examination, I have found nothing the matter with either, but a highly furred tongue, I have ordered them a good efficient purgative, and in a day or two they were free from pain, and remained so until the digestive organs got impaired or had again lost their tone.

The accident of breaking part of the alveolar process underneath the fulcrum, proceeds from putting it too low on the gum. This is generally the case with an inexperienced operator, though, it must be admitted, that such lacerations are not of much consequence, as they heal soon, and of the two it is better that the alveolar process should be torn, than that the tooth should be broken, and the fangs left to be operated on, as has been stated.

It also happens, not unfrequently, that an excessive bleeding or hemorrhage follows the extraction, particularly after removing a second molaris of the lower jaw. This taking place, under the operation of a bungler, might be of serious consequence. It will happen even when scarcely any force has been applied. Various styptics are recommended, such as alum, turpentine, solution of nitrate of silver, the actual cautery, or the replacing of the extracted tooth, &c. though a well applied pressure is the only sure application.

During my practice I have only met with three instances of hemorrhage. The two first I stopped by adopting the German plan of plugging the cavity with a piece of *amadou (German tinder)*, which succeeded admirably. To the third I was called in after the hemorrhage had lasted for three hours, and nothing could stop it until I adopted *Bell's* plan of pressing a strip of lint (wetting it with the solution of the nitrate of silver) in the cavity, and keeping a compress over it, which, by shutting the mouth, was kept in its place.

In conclusion to this part I must say, that although I strongly advocate a well constructed key in preference to the forceps, there are many instances where "paces" or other instruments must be used in its place. Few dental instruments have been, or are constructed, either in England, France, or Germany, but I have immediately supplied myself with them, or occasionally made some myself, so as to be completely acquainted with their use. Perhaps, on a future occasion, I may publish a little work on this subject.

CORRECTING THE IRREGULARITIES OF THE TEETH.

It has already been stated, under the head of "Second Dentition," that if attention were paid to the teeth at the proper period, few irregularities would be met with; but this not being frequently attended to, the dentist should, in every case, and at every period, be prepared, and have such remedies at hand as will remove, or, at least, improve those deformities.

The greatest number of irregularities will be observed in the arrangement of the front teeth of the upper jaw, which chiefly proceed either from the non-removal, at the proper time, of some of the temporary teeth, or from want of room in the maxillary arch to allow them to stand in an even position. Hence the front teeth will lap over, or they will project forward or inward; or if those are standing in their proper position, the lateral incisors will be out of their circle. Frequently, however, the four front teeth will stand regular and even, and the canine teeth project like tusks, as they come through the gum at a later period. Should the others stand in an even row, closely arranged one near the other, the canine teeth must either project outwardly or inwardly. If the former, they have a most repulsive appearance, and at times will cause the upper lip to be greatly injured; if the latter, they will cause a great annoyance to the tongue, and an impediment to the speech. When this irregularity is not of long standing, the removal of the two first bicuspides (small grinders), one on each side of the jaw, will generally give sufficient room for the uneven teeth to fall in their places. In some cases the removal of but one bicuspide will be sufficient; and cases will present themselves, when, after the removal of one or both bicuspides, a pressure must be added to assist or force them to their proper position. No positive rule could be laid down or pointed out to guide the operator, as attention, practice, and judgment can be his only teachers. Very few cases are alike, and, consequently, each will require a treatment accordingly; but whatever the irregularity may be, in almost all cases it may be removed, and even after long neglect, they may be remedied by mechanical contrivance. The upper front teeth are generally more liable to irregularities than the front teeth of the lower jaw; but if met with, they are to be treated in the same manner as those of the upper jaw.

Nothing can be more injudicious than the too early removal of the temporary teeth in children; yet, frequently, the whole of the temporary set are extracted by unscientific operators, under the idea, and with the assurance to the parents, "that this treatment is required so as to make the permanent teeth regular," when, in fact, this very injudicious treatment is the cause of most of the irregularities met with.

If the irregularity of the second set consists merely in having the front teeth of the upper or lower jaw in an uneven standing, or that they lap a little over, this frequently may be corrected by passing a thin file between each of them in the front row, by which means sufficient space will be obtained; and if a frequent pressure with the thumb and finger be afterwards applied, such an irregularity will be remedied.

To give the young practitioner, however, an idea of cases of a more difficult nature, I shall state one or two, and the manner in which I have treated them, by which means, I trust, he will be enabled to know how to manage in similar instances.

Case 1. G. D., a young lad of about eleven years old, was brought to me to have his mouth examined, and a treatment to be adopted to redress the great irregularity of his teeth. The irregularity existed chiefly in the front teeth of the upper jaw, as may be seen, fig. 10, plate II. The two front and lateral incisors are of the permanent set, and, as may be seen, the two front teeth (*bb*), the one on the left side projected sideways, so much so that it caused the upper lip to rest on the side edge of that tooth, and split the lip, which was always sore and painful. The front incisor on the right side diverged inwards of the mouth, which caused a space between those two teeth, and when the mouth was closed caused the front incisors of the lower jaw to press up between them. The two canine teeth (*aa*) belonging to the temporary set, through not being removed at the proper time to give room to the four front teeth, were the cause of this irregularity. Those two teeth (*aa*) I removed; immediately after which I took a model, or impression of the gum and teeth in front of the mouth, in wax, and made from that a plaster of Paris model; I then made one of brass, to be stamped in lead, so as to enable me to strike or press a strip of gold into the exact shape, to be applied to the front of the outward projecting tooth. This strip of gold, when in the mouth, ran from *cc*, the two first bicuspides, for which I constructed little caps of gold, which fitted exactly the crowns of those teeth; one of those caps was then soldered to each extremity of the strip of gold, and the bottoms of them left sufficiently thick, so that when the mouth was closed it prevented the front teeth of the lower jaw meeting between the two front teeth of the upper jaw. Next, two holes were drilled through the strip of gold, opposite the front tooth that diverged inwardly. When this plate was put in the mouth, in front of the teeth, a ligature was passed through those holes, so as to hold and draw the inward tooth forward. This ligature was renewed every day, and the gold plate cleaned, and in less than one month I had the satisfaction of seeing the teeth in their proper position.

Case 2. A young gentleman, between twelve and thirteen years old, came to me to have his teeth examined and regulated. The teeth of this young lad were fine, healthy, and strong, only (as may be seen, fig. 2, plate II.), the front and lateral incisor lay inwards of the mouth, so much so, that when he closed his mouth the front teeth of the lower jaw passed before them, though the two other front teeth of the upper jaw were in their proper position when the mouth was shut. The front teeth, the canine teeth, and the small grinders on each side of the jaw, were all of the permanent set, and there not being room for the two teeth that diverged inwardly, I removed the first small grinder (*a*) on the left side of the jaw; this done, I took a model of the four front teeth of the lower jaw, and constructed a gold cap, wedge-shaped (see fig. 12, plate II.), which, like a thimble on the finger, slided over the front teeth of the lower jaw, and, being perforated with little holes, was tied to those teeth. This acted most admirably, for it prevented the mouth from shutting, and every time the mouth was closed a fresh impulse was given to drive the upper teeth forward. This, as in the foregoing case (No. 1), was cleaned and replaced every day, and within three weeks the teeth were in an even and remarkably fine arrangement.

Many cases of different formation and treatment might be added, but to any one who makes dentistry his profession, these will be a sufficient assistance, and will point out to him how to proceed.

Should this work be received by the profession with any degree of encouragement, it is my intention to publish, at some future period, a pamphlet, treating exclusively of the irregularity of the teeth, and of their management.

MECHANICAL DENTISTRY.

MECHANICAL DENTISTRY.

It is stated by *Gray**, that amongst a hundred and twenty individuals calling themselves surgeon dentists in the London Directory, there are only seven to be found in the list of the Members of the Royal College of Surgeons, published in August, 1836.

In the same proportion, perhaps, one in every twenty of the dental practitioners throughout the kingdom can only, with right, assume the title of Surgeon Dentist.

The dental profession generally, then, is practised, as it appears, by but very few who have been regularly initiated, instructed, and admitted as sound and experienced dentists; or by a few surgeons who employ a workman to manufacture the artificial teeth, or pieces ordered to them; or by some ingenious watch-maker, or jeweller, who sets up and becomes a dentist; and, lastly, by a class of assuming, conceited, itinerant quacks.

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* See his edition on Dental Practice, published in 1838, p. 9.

The last of these self-styled dentists are men who have neither talent nor experience, nor a knowledge of surgery or mechanical science; but they have an abundant share of impudence. This class of pretenders, too, has of late years increased considerably, owing to the unprotected state of this branch of useful science; and wonderful to relate, some of those impostors have succeeded, not by dental operations or plugging their patients' teeth, but by "plucking the money of the too credulous multitude" into their own pockets. Those quacks, it is true, have in many instances brought the dental profession into disrepute; but on the other hand they have given a surfeit to most of their dupes, so much so that, like a burned child fearing the fire, they have learned the difference between being in the hands of an impostor and under the care of a well instructed operator. From these prefatory observations it will be seen that the profession of the dentist is by no means so easily acquired as might be supposed, and, as I shall demonstrate in this section all the requisites necessary to be possessed by the regular dentist, I shall leave the reader to judge for himself; it is, therefore, almost certain that any piece or partial set of teeth, unless made by a well instructed and regular dentist, will but seldom be well constructed, so as to answer the requisite purposes, viz. comfort in mastication, pronunciation, and appearance, without the fastenings or clasps of gold being seen, and allowing the artificial teeth to be taken out and replaced in a moment by the wearer; for let it be observed that artificial teeth, which cannot be removed at the will of the wearer, are nothing but a reservoir of stench and corruption in the mouth, and a disgrace to the bungler that made them.

That dentist who is afraid of soiling his "lily-white hands" in his work-shop, and cannot make use of hammer, file, drill, and blowpipe with the same dexterity as he would apply the lancet, key, or elevator to his patient, will produce but sorry pieces of mechanism. No artificial teeth will ever be what they ought to be, unless the mould is taken, the plate and teeth made, tried, and finished, and placed in the patient's mouth by but the one man. As for the plan that is generally adopted where there is a great run of business, namely, the master takes in wax the impression of the patient's mouth, he then sends it to his workshop, and a workman makes a mould in Paris plaster, another casts a mould from this in brass, and a fourth makes a gold or platina plate, or carves a slice of the tusk of the hippopotamus to fit on the plaster of Paris mould, puts teeth on the one or the other, fits it to the mould, and, when the patient calls, it is placed in the mouth—how is it possible that such a piece can well and properly fit, the artist who made the teeth never having inspected the mouth in which they are to be placed? Every working dentist knows that when a mould is taken, and a plate and teeth made to fit that mould exactly, they never will fit the mouth rightly. If (as I always do) the plate is tried in the mouth before putting on the teeth, it will be found that, after the plate has been perfectly fitted to the mouth, it will not do so to the plaster mould, without cutting or paring it a little here and there; this, however, is the only proper way of producing a good fit. Nor do I hesitate in saying, that it is next to impossible to produce well fitted artificial teeth made by a workman who never saw the mouth they are intended for.

As to the class of itinerant quacks that infest the country every where, they do not deserve notice at all, but it will not be out of place to acquaint the reader how they carry on their trade. There are, in the metropolis, three or four extensive working dentists, who employ several hands: they produce well-finished pieces on gold, platina, or carved in bone, which are put in handsome morocco cases, and are made to order, and upon moulds supplied by the "gentleman dentist," that is, one who cannot and does not know how to make them himself. Those working dentists will, for a fee of a few pounds, give a few instructions to any young aspirant: that is, they will tell him how to stop a tooth, acquaint him with some of the technical phrases, and show him how to take an impression of the mouth in wax. With this limited stock of knowledge in dental operations, our hero starts for the country, elegantly dressed, adds a *Monsieur* or *Signor* to a borrowed name, and, with wonderfully promising advertisements, commences his newly acquired profession. He now gets his credulous customer, takes a mould of his mouth, and sends it to his instructor, the wholesale tooth manufacturer, who sets to work, makes the artificial teeth (at so much per tooth), without knowing or having seen the mouth it is intended for. How is it possible that such pieces can ever fit properly? The idea itself is ridiculous. However, it is forwarded to the new dentist, crammed in the mouth of the patient for better or worse, and, after a few days' suffering, disappointment, and waste of money, it is thrown by. No wonder that we hear so many complaints, arising from the bungling of those *soi-disant* dentists.*

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* "A benevolent regard for the public welfare forbids that any dentist should pretend to qualify students for general practice, by giving them access for a few weeks only to his office, and a general certificate of skill and competence. The truth is, the profession of dentistry is both an art and a science: an art that requires great mechanical skill, and science demanding much mental cultivation. Such an art never can be acquired without long practice, especially by

The dental art in France, Germany, and Holland, cannot be followed by any person except he has been previously initiated in all its various branches, and is found, on public examination, to possess the requisite surgical and mechanical skill, when he is appointed a surgeon dentist. By this precaution, pretenders and empirics are precluded from imposing upon the community, and society is guarded against becoming the victims of deception and imposture. In England, the contrary is the fact. Here, self-styled dentists abound in great numbers, though, of course, there are many who are really scientific practical professors of the art; but the number is quite insignificant compared with the vast many itinerant charlatans to be found in all parts of the kingdom—men whose only title to practice the profession is founded on ignorant assumption and "make believe." To render the dental art of real service to those requiring its assistance, a dentist should

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one who has not been bred at some kindred calling: and such a science should claim years of research and general mental culture; particularly of those whose previous education has not been strictly, if not technically, preparatory. Most other professions are protected, either by statute or organised associations, from the encroachments of incompetence and imposture. Ours is guarded by no civil enactments, and of consequence the members should supply the defect either by their individual or collective efforts"—*American Journal of Dental Science*, Vol. 1, No. 11, p 7.

not only be acquainted with the anatomical nature of the teeth and gums, but should also have some knowledge as a chemist, jeweller, sculptor, and metallurgist, and, above all, have great experience; for if he is obliged to send the moulds which he has taken of the mouth to any other workman to be executed, there is great probability that not one in fifty will answer the purpose for which they are intended. Unless this is attended to, and the teeth are carefully fitted to the mouth by the person who has made them, it is next to impossible that they can prove either servicable or comfortable to the wearer.

Albucassis, an Arabian surgeon, who flourished between the eleventh and twelfth century, was, as has been confidently stated by many authors, the first who taught that teeth could be replaced, whether natural or artificial, and describes them as being made, in his time, of the bone of an ox, and to be kept in their place by ligatures of gold wires, similar to the fastening of loose teeth, or such as are transplanted. There can be no doubt, however, that false teeth were in use long before the Arabian author's existence: the unrolling of an Egyptian mummy, some years ago, in Paris, having false teeth inserted in the front of her mouth, goes far to support this supposition.*

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* *Lucian* and *Martial* mention the wearing of ivory teeth, being

Ambrose Paré, who flourished in 1579, was in many respects a close imitator in his operations as laid down by *Albucassis,* in respect of tooth drawing, and mentioning the absurd idea of transplanting a tooth from one person's mouth into the mouth of another, he says "a princess was obliged to have a diseased tooth extracted, and, applying to a surgeon, she brought with her one of her waiting maids, who stood by the side of her mistress, and when the tooth of the princess had been extracted, a sound one also was taken from the jaw of the girl, and placed in the socket of the jaw of the former, which took root, and became sound and healthy, and adds, *cela ay-je ouy dire, mais je ne l'ay pas vue.*" *Hunter,* after *Ambrose Paré,* in many instances followed those rules laid down by him, and advocated strongly the transplanting of teeth. Nay, it has even been stated by many that *Hunter* was the first who introduced this practice. No doubt but, at an early period, the teeth that were first made to supply the place of those that were lost, were made of bone, rude enough, as we may suppose, and were then tied or fastened to the adjoining ones by ligatures of silver wire or silk. This method was even followed some fifty years ago, but the improvements in

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tied with ligatures, as a practice amongst the Romans. *Maximina,* it is stated, had three artificial teeth, in the front of the mouth, made of box and varnished over.

this branch of *prothese* went on rapidly, until several more judicious and agreeable contrivances were substituted.

TEETH MADE OF THE TUSK OF THE HIPPOPOTAMUS.

The methods adopted at an early period of dental science, before the superior construction of "mineral or *terro metallic*" teeth was known, consisted chiefly in making teeth of bullock's bone and ivory, pivoting or grafting, and the transplanting of teeth from one person into the mouth of another. I shall speak of each of these methods.

The tusk of the hippopotamus being found the hardest of all animal substances, has been used with much advantage in constructing artificial teeth, on account of its whiteness, smoothness, the fineness of its grain, and its capability of taking a fine polish.

The tusk of the hippopotamus being cut in slices, from an inch to an inch and a half, such pieces are made use of as will be sufficient in size to carve the required number of teeth. To execute teeth with gums, &c. well, requires various files, saws, and gravers, a great deal of practice and ingenuity. After a correct model of that part of the gum that requires teeth has been obtained in plaster of Paris, and sufficiently hardened, the artist has to cut his ivory somewhat in the rough shape of the piece required; he then takes a mixture of red bole and olive oil, or any other colour he chooses, and with a hair brush lays a coat of paint on his model, when the piece of ivory is lightly put on the surface of the mould, and wherever the ivory receives a mark of the paint, it is to be cut away by the graver, after which it is replaced again and again, and cut away until the colour stains equally the hollow groove which is intended to lay upon the gum: this being accurately executed, it will perfectly fit that part of the gum for which it is intended. Next the outer part is to be formed into teeth, and of such a shape as the vacancy of the jaw requires, or if it is intended to have natural teeth (human teeth) upon the base of the ivory, such teeth as the mouth is in want of are screwed or riveted upon it; holes are then drilled in certain parts to put ligatures to some of the remaining teeth, or clasps of gold riveted to the ivory, to go round some of the adjoining teeth, and by this means the piece is kept in the mouth.

There are dentists who have gained some celebrity in the construction of this kind of artificial teeth, and produce pieces (partial sets) or whole upper rows. By being accurately shaped and fitted to the mouth, they will be kept in their place by capillary attraction and atmospheric pressure. Neatly executed and well proportioned as those pieces are, they fall greatly in estimation compared to more modern improvements.

To my brethren in the profession I need say nothing, for every one of them has had opportunities sufficient to see those so much vaunted "clean and only congenial substance to the mouth," after having been worn for a few months, completely saturated with putrid deposits, the gums swollen, red, and highly inflamed, emitting from the mouth a stench sufficient to turn the stomach of any person possessed of the least acuteness in his olfactory nerves.

To say nothing of this contaminating putrid accumulation being carried to the stomach of its unfortunate wearer, the unavoidable thickness, the liability to discoloration, decay, and the expence of frequent renewing, are insurmountable objections to the use of human teeth set on a base of bone.*

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* "When a surgeon, I was consulted by a lady, who had fallen into such a state of weakness as produced considerable fears for her life. On approaching her I perceived a tainted odour, which I thought proceeded from her lungs or teeth, which were black. I examined her mouth, and was struck with the bad state of a set of human teeth, implanted on a base of the tooth of the hippopotamus. This set of

The advocates of this description of artificial teeth intimate to their patients that, as they are not made of metallic substances, there can be no galvanic effects; but they forget, that if human teeth are used on the hippopotamic bases, the screws, rivets, and spiral springs are all of metal. My opinion is that those constructed pieces look better in the morocco case in which they are handed, or as show pieces in glass cases, than fit for the mouth, where they are exposed to the constant saturation of every thing that is put into it.

teeth being removed, I perceived her mouth to be almost entirely covered with small ulcers, and I had no doubt that her disease was the effect of the putrid exhalations which proceeded from the set of teeth, and which corrupted the air she breathed. What confirmed this conjecture was, that after having laid these teeth aside, her health improved in a few days"—*De Chemant's Dissertation on Artificial Teeth*, 1788.

PIVOTING OR GRAFTING OF TEETH.

Pivoting of the crown of one tooth upon the root of another is of very old origin.* Before the introduction of gold or platina plates, and mineral *terro metallic teeth,* it was considered the *ne plus ultra* of dental mechanical science. Much as is taught of this method by some of our dentists, there are many objections to be made to this mode of remedying the loss of teeth. If every operator who advocates the plan of pivoting was a surgeon, or perfectly aware of the serious consequences, the danger, and even the fatal result that might issue,* he would frequently pause, and adopt the safer system of gold plates. What swelled faces, gum-boils, torture, and pain, has not this pivoting system been the cause of, under the most favourable circumstances! There is always more or less irritation, and very frequently the operation must be desisted from, perhaps when nearly finished. I do not deny that this operation has very often succeeded, and been free from any unpleasant effects, and admirably done, so as not to be detected on the closest examination; but what is gained by it in the end? The canal of the root of the tooth becomes larger, the pivot then becomes loose, and cotton or silk must be twisted round, so as to render it thicker, and make it stick firm in the root. This may answer for a while, but the decaying process still goes on, until it loosens afresh, when recourse must again be had to putting more cotton, twisted round the pivot, to fasten it afresh. This cotton twist or silk becomes completely saturated, and affected breath is the consequence, until, at last, it loosens so much that the root is ejected, and recourse must be had to a gold plate, with the required teeth put to it. This being the case, why is it not done at first? Surely any well instructed dentist can make any number of teeth mounted on gold, which will be far stronger, better adapted, and answer every purpose of mastication and articulation, without any fastenings or gold being seen, besides having the advantage of being able to be removed and replaced at will, without affecting the animal system in the least. But if the dentist applied to is unacquainted with the more modern processes or workmanship, then, of course, he must have recourse to pivoting: it requires but a few files and drills, is quickly done, and the fee soon pocketed. During all my practice, whenever applied to for the restoration of teeth, I have never pivoted a tooth, unless insisted upon by the patients (who have been but few), after telling and making them well acquainted with the consequences that might follow.

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* "When either or all of the six front teeth are decayed and painful, or so unsightly as to render their presence disagreeable, they should by no means be extracted, for by filing them off close to the gums, an artificial, or, which is far preferable, natural teeth, may be fixed to the roots. In doing this, the natural canal in the root is enlarged, and the nerve, of course, destroyed, so that after the teeth are properly set no tooth-ache can ever occur, nor is the operation itself attended with the pain generally supposed; frequently it does not occasion any at all, for we observe that the bony substance of teeth has no nerves, consequently no feeling; therefore filing it gives no real pain, only a trifling kind of jar, which soon passes off"—*Fuller on the Teeth*, p. 107.

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* Most of my medical friends in Stafford will remember the consequence that followed the operation of pivoting a tooth (performed by a dentist of some repute) of a most respectable lady of that town, a few years ago: the most alarming symptoms manifested themselves, and but for the timely interference of medical attendance, and the removal of the pivot construction, would, there is no doubt, have ended fatally.

Besides, pivoting is only applicable, at least with success, to the six front teeth of the upper jaw; and very frequently there will be wanted back teeth as well, unless, by a sudden accident, the front teeth alone get injured. If back teeth, then, are wanted, as well as front teeth, and the operator supplies only those wanted in the front by pivoting, and leaves vacancies between the molares, not being able to pivot them, he certainly proves his want of skill, and total ignorance of the functions *"des organes buccoux."*

The dentist who has any pretensions to his profession must be able to make and construct teeth, and restore all deficiencies appertaining to the mouth, whether they be required in metal or animal substances, for it not unfrequently happens that a patient is self-willed, and will have teeth supplied as, perhaps, he had them before, though of ever so bad a construction. In such a case the dentist has to choose either to reject the order or proceed. But if his patient insists on having teeth pivoted, the roots of the teeth to be pivoted should be examined to see if they are sound, and able to admit the sawing (with a little saw made for that purpose); the crown, or the remaining part of it (if there is any of it left to the root) is then sawn even with the gum. No nippers should ever be used to do this, as it not unfrequently happens that in the act of nipping off the crown the roots will split; besides, the sudden shock experienced at the moment the excision is produced by the nippers, is by far more painful and distressing than extraction itself; whereas, by using the saw for this purpose, no pain is felt by the patient, and the root is kept unfractured. This done, a half-round file, neither too coarse nor too fine in its cut, is used to give the fang a proper slightly rounded or arched cavity, to receive the intended crown of another tooth, "cup and ball like." Next, the canal of the fang is to be enlarged or widened by a properly tempered drill, which is to be gently rolled or twisted between the thumb and forefinger of the operator, with a steady hand, in the canal of the root,* until sufficient to admit the golden pivot. After this, it was the custom formerly to have a steel wire heated to a white heat, which was then quickly introduced into the canal of the fang, so as to destroy the sensibility, or, as it then was called, "to kill the nerve." This practice seldom, however, would produce what it was intended for, as the steel wire generally was too cool before it reached the nerve to produce the desired effect. The rotation of the drill in enlarging the canal will generally be sufficient, but the surest way is, after the canal in the root has been enlarged, to introduce and twirl round in it a fine hair pencil, dipped in a strong solution of nitrate of silver; but if the hair pencil cannot reach the end of the canal, then a thinly cut wooden point, dipped in the solution, is to be used in its place. A natural human tooth is then chosen to match those in the jaw, of which the crown is sawn off, and shaped or rounded so as to fit exactly the arched space of the root. This done, a little soft wax or dissolved gum is spread over the surface of the rounded filed part, which is then perpendicularly pressed against the cavity of the root. By doing this a mark of the hole is pressed on the crown, where a hole must be drilled, and a pivot, which has previously been filed to fit exactly the cavity of the root, firmly screwed in, and a little soft cotton is wrapped round the rough part of the pivot, which is then inserted in the canal of the root.

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* In enlarging the canal of a root the operator must be cautious, so as not to break the drill in the fang, a circumstance or accident which is not impossible to a young beginner. On two occasions I have met, when extracting the roots which had been pivoted, with pieces of a broken steel drill lodged in the cavity.

If the dentist understands the management of mineral teeth, which are superior, and by far more cleanly and lasting, he must choose, prepare, grind, and solder such a tooth as will match, in colour and shape, those in the mouth. Teeth of bone, and such as are made of the tooth of the hippopotamus, should never be used, on account of their discoloration and the offensive odour they create. Those kinds of substitutes are only advocated by bunglers.

Nor should any other pivots be used but those of gold or platina. Some dentists use pivots of hickory wood, which are greatly to be objected to, for, after the pivot of wood has been inserted in the canal of the root, the moisture of the mouth causes it to swell, and not unfrequently, by its expansion, causes the fang to split.*

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* A lady near Uttoxeter had a tooth pivoted with a peg of wood; a few days after which she felt great pains and uneasiness along the front of the upper part of the jaw—inflammation, with swelling, fever, and suppuration followed, which lasted, off and on, for five weeks, when one half of the split root was expelled from the inner side of the gum, and the other half lay transversely buried, projecting partly between the gum and upper lip. This being removed, and the slough cleaned, and washed with tonic and astringent lotion, healed rapidly, but it left a cavity an inch up into the gum, leaving the roots of the adjoining teeth completely bare; this afterwards I had to fill up with part of an artificial gum, to which a mineral tooth was affixed.

TRANSPLANTING OF TEETH, &c.

To perform this antiquated and abominable operation requires three persons. First, an individual silly enough, for the sake of a few shillings, to submit to have a healthy and sound tooth torn out of his jaws; second, the individual in want of it, cruel and hard hearted enough to deprive the first of what nature has given him, and, by paying for it, transferring it to his own jaw; and third, the individual who performs the operation, and who, to say the least of it, outrages all humane feeling for the sake of emolument.

Fortunately this cruel and unprofessional operation is now but seldom, if at all, performed. No dentist who has the least claim to scientific treatment in surgical or mechanical dentistry would attempt it, or sully his reputation by being accessory to this always unsuccessful and brutal operation.

Nor do I think it necessary to introduce an exposition of this method of supplying artificial teeth, for any other purpose than to deter the unacquainted reader from desiring an operation which is remarkable only for its cruelty and absurdity. If a tooth be extracted from one person's jaw, and immediately put into the socket of another, the vessels of the periosteum being fresh and bloody, there is no doubt but they will unite, and the tooth adhere firmly for some time. This may be seen by having a fresh extracted tooth transplanted into the comb of a cock, where it will adhere firmly. It frequently happens that a sound tooth is to be extracted to make room for the adjoining ones. In such a case, the curious operator may make this experiment without inflicting the pain of extraction solely for his own gratification.

But setting aside the cruelty of disfiguring one person for the convenience and appearance of another, the greatest objections to be made are, first, that it is totally impossible to find a tooth in one person's jaw that will exactly fit the socket of another; and secondly, the great risk and danger of inoculating the individual with the diseases of the one from whom the tooth is extracted. Those of my readers who would like to know more of the alarming effects that have followed the transplanting of teeth, I would advise to read the medical transactions communicated by *Dr. Watson*, read at the College of Physicians, May 28, 1785.

Many instances are on record where persons have met with accidents from being thrown from a horse, or out of a carriage, and have had two, three, or four front teeth knocked out, when, by cleaning and washing them in a little lukewarm water, and replacing them immediately in their sockets, keeping them steady by a ligature, they have adhered and remained firm for years.

But the operator who, in the present improved state of dental science, could lend himself to the transplanting of teeth, is unprincipled, and knows nothing of the profession he assumes.

After all the before-mentioned systems of artificial teeth had been proved to be mainly inefficient, it is by no means surprising that men of mind and experience in the profession should have devoted their labours to improvements, some of whom eventually succeeded in producing substances better calculated for the purpose, cleaner, more durable, and of superior construction. Amongst them the invention of "terro metallic teeth" and the adoption of gold plates stand pre-eminent. It was in 1787 that the idea first occurred to *Monsieur De Chemant*, a surgeon in Paris, after seeing the ulcerated mouth of one of his patients, occasioned by a bulky set of artificial teeth made of bone, to supply their place by teeth made of a kind of porcelain; and in 1789 he presented to the *Académie de Chirurgie* a treatise on the manufacture of a superior composition—*pâte minerale*—for the making of teeth. Great as this invention was, in respect of cleanliness, &c. &c. it fell short of answering in every respect as to its adoption to the exact fitting of the gum, for, although the pieces were moulded when in a paste-like state, upon exact models of the mouth, after having gone through the baking process in the furnace, they became so much contracted in shape and size that they never fitted correctly. To obviate this, a plan was adopted of putting teeth made of this composition on plates of gold, which succeeded admirably; and it is said that *Talma,* the father of the great French actor, was the first who introduced the use of gold plates. Such a system of constructing teeth in every respect preferable, was sure to become general, and from that period we may date the most essential improvements in the dental art. This method of constructing artificial teeth, however, was a puzzler to the generality of the dentists of that day, whose only knowledge consisted in the working of bone, and the drilling and tying (by ligatures) of human teeth to those left in the mouth, and as the mineral teeth required a perfect knowledge of soldering and the use of the blowpipe, those dentists adopted the plan of riveting or screwing human teeth, or such as were made of bone, to the gold plates. Within a very few years, however, the demand for those composition teeth (by some called "*terro metallic* teeth") became so general, that most of the dentists acquainted themselves with the process of working them; and during the last twenty years *terro metallic* teeth have been made with wonderful improvements in France, England, and America, of most superior beauty and durability, of every colour and shade, so nearly matching the teeth of every individual, that they approach to nature itself.

I shall now proceed, and draw a comparison between the teeth made of bone, human teeth, and mineral teeth,* each of them mounted on gold plates.

It is to be understood, that the gold or platina plates (of their construction I shall speak bye and bye) must fit exactly the gum and the inner side of the palate, if they are found necessary to extend so far. When pressed with the finger, they must bear equally upon every point of the surface they cover, and lie close to the necks and roots of the teeth they surround. Nor must they, if pressed on one end, rise or rock on the other. If they do either, they are badly made, and not worth the trouble of working nor the expence of the patient. But taking it for granted that they fit well and comfortably, I come now to the mounting of the teeth.

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* Mineral oxides forming a principal part in their composition causes them to be called mineral, or *terro metallic*, teeth.

The putting of front teeth made of the tusk of the hippopotamus upon gold plates (back teeth, technically called "blocks," excepted) is completely done away with, on account of their discoloration and unnatural appearance; but human teeth are frequently used, and, until *terro metallic* teeth were introduced, nothing better could be substituted. If human teeth are to be put on gold plates, the required teeth are chosen to match; the crown is then sawn off each, and a hole drilled through; this done, the teeth are cut with gravers, and filed to fit exactly upon that part of the palate for which they are required, when the plate must be put in the mouth of the patient, and the teeth (each in succession) are held to the plate, when, with a pointed drill, the place is marked through the hole of the tooth where the pivot that is to hold the tooth is to stand; next, holes are drilled through the marked spots on the plate, and as many gold studs, or pivots, are soldered to the plate; the plate is then put on the plaster of Paris mould, and the teeth, one after another, are properly fitted. By using a little red colour and oil, and putting it on with a hair brush to the plate each time before the tooth is put on to fit, it will leave a coloration on the surface of the tooth, which is to be cut away, and repeated until the surface of the tooth bears equally upon every part of the plate round the pivot. If every tooth then fits perfectly, it is dried, and a little thick varnish of gum mastic, dissolved in spirits of wine, should be laid on the plate, round the peg, to prevent moisture getting between; then the tooth is put on, and the pivot firmly riveted. Next, a very small hole must be drilled a little distance from the rivet, through the tooth and plate, and a second pin (platina will answer best for this) be either screwed or riveted on both ends; this will keep the tooth steady, and prevent it from turning on the pivot.

This, generally, is the manner in which human teeth are mounted, though some dentists have different ways of proceeding, but still it comes pretty near to the same in the end.

Human teeth, no doubt, can be matched with such exactness to the mouth as to defy the closest examination, but the objections to them are their aptness to decay, and the repulsive reflection of wearing teeth of dead men's bodies, who died, perhaps, of diseases in a hospital.

Let not the untutored reader start when he is informed, that all the bodies of the dissecting room have their teeth taken out and sold to the dentists, whether they died of fever, cholera, small pox, syphilis, or any other disease. Even the grave-digger will make a perquisite of the teeth extracted from exhumed human jaws! Surely, then, the idea of seeing an interesting looking female with a mouth supplied from what belongs to the grave or dead-house is any thing but enticing. Some dentists will say, "We get our teeth from healthy bodies taken out of the field after a battle." But battles are not fought every day; nor is the supply one hundred thousandth part sufficient, when we consider that there are annually exported, from Paris alone, half a million of mineral teeth.

The most unobjectionable, the cleanest, the most unchangeable, and lasting artificial teeth that can be produced, and worn with complete satisfaction, are, unquestionably, the *terro metallic* teeth.

The arrangement and preparation of the gold or platina plate, whether for human or mineral teeth, is the same. If the latter are to be employed, they must be matched and ground on a revolving grinding-stone to the precise shape of those they are to be placed in contact with in the mouth. Next, the holes that are to contain the pivots, to be attached and soldered afterwards to the teeth (which have for that purpose two, three, or four little platina studs affixed to them by the manufacturer), are marked with a pointed scraper on the plate, and, when found correct, perforated. This done, golden pivots are soldered to each mineral tooth; they are then put altogether in their respective holes on the gold plate on the mould of plaster of Paris, and to prevent them, when in the act of soldering, from changing their position, a little wet plaster of Paris is put in front all round them. When partially dry, the solder, with solution of borax, is laid on with a hair brush. The whole is then laid on a large piece of charcoal, and by the use of a blowpipe, through the flame of a spirit lamp, soldered all at once to the gold plate. When cold, little backs of gold or platina, to cover the unevenness and roughness of the back of the teeth, are prepared, and after being well fitted, are soldered on in the same manner as before,* when the whole is, as jewellers call it, put in pickle (which is one part of sulphuric acid and five parts water), and when clean is brushed and polished, and the work is finished.

In many instances the backs are left off, and with some reason, as, in fact, they are unnecessary, and cause cavities for the accumulation of unpleasant deposits. To those of my brethren in the profession who have had occasion to repair similar pieces, after having been worn for some time, I need not describe the effluvia that is produced when they are exposed to the lamp for repair.

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* Some mineral teeth are made by *Billar*, in Paris, which have eyes to their backs, like the eye of a button; the French call them "*dents artificielle*," *à* "*tenon*" *et* "*crampon*." Those teeth have a preference in working them, as the pivots can all be soldered to the plate, and the teeth afterwards fitted and soldered altogether, without using wet Paris plaster to keep them in their places while soldering them.

I am far from approving of the adopting of mineral grinders. Sound blocks of the hippopotamus will answer better; but where the patient can and is willing to go to the expence, the back grinders should be made of gold, either solid or hollow.

The gold that is to be used for plates should neither be too soft nor too hard, and never less than eighteen carats. The proper standard, which I generally make use of, is twenty-one, alloyed as circumstances require, either for hardness or ductility.

Where there is a great nicety required, platina plates are preferable, as they can be soldered with pure gold, which is a matter of some consequence to an acute palate.

A nobleman of ———, while at Buxton, in 1836, consulted me. He had two whole sets of artificial teeth, extremely well executed, in morocco boxes, lined with velvet. They were human teeth, mounted on gold plates, with spiral springs of the best construction, and were supplied by one of the first dentists in London. He complained of experiencing a peculiar taste whenever either of them was in his mouth. On examining those pieces, I found they were of standard gold, and attributed the taste he complained of to the solder that was used in putting the pivots to the plates. I advised him to try a set of mineral teeth, mounted on platina. He agreed to the proposal, and I made him a set as follows:

After having constructed the upper and lower plates of platina of sufficient strength (in the same manner as gold plates are made), I made the back grinders of hollow cases of the same metal, completely air-tight, soldered with virgin gold to the plates. Next, mineral teeth were put on, likewise soldered to platina pivots; after which I took a model of both upper and lower piece, and constructed, on a stamp of brass, a strip of platina plate, which fitted exactly, properly shaped, so as to form the back of the upper and lower teeth. Those pieces were not soldered to the back as usual, but were kept in their proper position by a little platina screw, screwed in on each side to the end of the platina case which formed the back grinders. By unscrewing those little screws the back plate could be removed, and both properly cleaned, brushed, &c. The spiral springs I made of fine gold, alloyed to a consistency with fine filings of platina, a method not generally known. After this I prepared the whole for enamelling (in a little muffle of a furnace) the colour of the plates corresponding with the inner side of the mouth; and to the cases that represented the back grinders I gave a colour to correspond with the teeth. When finished, this set answered perfectly: no taste whatever was experienced. Such pieces become expensive, and require a dentist of great abilities to make them; but it is the most perfect construction known in the present state of the dental art, nor is it likely that any thing can or will be found to surpass it. The above set of platina teeth, I have the satisfaction to know, has now been in constant use by its noble owner for nearly four years. Nor has there been any necessity for a morocco box* to put it in, so as to relieve the gums from their pressure.

Whole or partial upper rows of teeth, if no teeth are required for the lower jaw, I uniformly construct so as to be kept in their places by mere atmospheric pressure and capillary attraction. Nor is this so difficult as it may appear to some: if they are made upon a perfect mould, and well fitted to the gum, very little exertion or practice is required to keep them firm in their places.

Notwithstanding the random assertions of those advertising charlatans who profess to fit artificial teeth without removing the decayed or diseased parts, and who ignorantly deny the necessity of their removal, artificial teeth can never be worn with ease and comfort until all decayed roots, pieces of fangs, &c. are removed from the jaws, and the gums entirely freed from inflammation, in order that the pressure of the plates may be equalised. It is easy to make such assertions, but under such disadvantages is it possible that artificial teeth can be worn? A boot-maker may just as well tightly fit a foot covered with corns, and tell his customer that it will fit as easily as if he had no corns at all!

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* It augurs unfavourably to see artificial teeth handed in a box: the only box they should be in is the mouth itself. No estimation of the workmanship can be formed by looking at artificial teeth, either in the hand or in a box; in the mouth alone can it be judged whether they are well or badly made.

The young practitioner who intends to become thoroughly acquainted with the dental art will, perhaps, find some difficulty if he expects to be taught all at once, by reading the present or any other instructions. The only and best plan to proceed upon will be to read the part which treats of mechanical dentistry to an expert jeweller or watch-maker, and by employing him, and observing how he files, solders, rivets, &c. the dental student will soon become acquainted with the means of proceeding regularly. Reading without practice will not do: as well might an individual expect to play the violin by reading a treatise on that instrument! Nothing but fiddling will make him a fiddler. Even so with the dental professor: patience, perseverance, and practice alone can make him a dentist.

METHOD OF TAKING MOULDS IN WAX AND PLASTER OF PARIS.

First, to a pound of yellow bee's wax add two table-spoonsful of Florence olive oil, and melt them together, after which it is to be poured out on a china dish, and when cold and formed into a cake, it is ready for taking the model in wax.

Second, have a couple of dozen of shapes of tin made to the different sizes of the required artificial pieces. Those shapes, some of the whole size of the upper and lower jaw, left and right, half jaws and fronts, are to be half an inch in breadth, and their upstanding sides about a quarter of an inch high. When a mould of the mouth is to be taken, pieces of the wax are put in water sufficiently hot to soften the wax, but not so as to melt it. When quite soft, one of the tin shapes (sufficient in size to cover the place where the teeth are required) is filled to the top with the soft wax, after which it is put and pressed perpendicularly (up or down) on the gum, or that part of it requiring the teeth. When completely pressed up to the gum, and the wax has been pressed close to the inner and outer part of the gum and the adjoining teeth, with the finger, it is to be withdrawn steadily, perpendicularly, and without moving in the slightest degree to either right or left. This done, the impression of the wax is put in cold water to harden, and when perfectly cold, a strip of thick paper, about two inches or a little more in breadth, is rolled round the shape, and secured by winding a thread round it. Next, a strong pin is to be stuck in each hollow space of the teeth in the impression, after which a quantity of Paris plaster is put in a jug or mug, and moistened with soft cold water to the consistency of thick cream; it is then gently poured in the wax model with a tea-spoon, care always being taken that no air bubbles are formed. This done, in about a quarter of an hour, when quite hard, the paper is taken from the model, after which it is put on a plate before the fire, when the wax will melt, and the Paris plaster mould be left clean on the plate. The unnecessary part of plaster is then to be pared from the edges, and after lying for a few hours in the sun, or before the fire, to dry, you will have an exact model of the jaw requiring the artificial teeth.

When the plaster of Paris model is found to be correct, it is sent to the brass-founder to have a similar one made of brass; after which a she-mould is made of lead on the one of brass. This done, sterling gold or platina plates, generally of the thickness of a playing card, or thinner if required, are stamped between the brass and leaden mould, and if the mould has been correctly taken, the gold plate so stamped will fit exactly the gum it it is intended for; but it will be frequently found that those stamped plates have to be corrected a little here and there, when tried in the mouth. If the plate fits correctly, little hoops or fastenings, to go round the adjoining teeth, are to be soldered to it, but always in such a manner that they cannot be seen when in the mouth, nor cause a stress or undue pressure round the teeth they are intended for. The proper method of doing this well can only be obtained by practice and ingenuity.

After the plate is thus prepared, the required teeth, either natural or mineral, are screwed or soldered to it (as stated before), cleaned up, and placed in the mouth.

TOOTH POWDERS, &c.

TOOTH POWDERS, PASTES, OR DENTIFRICES

Are innumerable, and of various compounds. Upwards of one hundred and twenty different sorts, variously recommended, are enumerated in one of the catalogues of patent medicines, each of them setting forth a peculiar superiority, though most of them contain pernicious ingredients, such as alum, cream of tartar, or camphor, which, to be sure, will render the teeth clean and white, but they act with such a destructive chemical effect upon the enamel, that in a few years they cause the total destruction of the teeth, to say nothing of the livid appearance and absorption of the gums.

The virtues of the ingredients and applications recommended by many, such as charcoal, gunpowder, salt, and soap, appear to reside only in their nauseous qualities.* "In a dentifrice we should expect neatness

* The Celtiberians used urine as a dentifrice—*Duval's Dentiste de la Jeunesse*, p. 7.

" Les femmes, ainsi que les hommes. avaient également recours and delicacy; on the contrary, nothing has been thought too disagreeable or too disgusting to be adopted. On the whole it is much better to trust to regular cleanliness by brush and water, than to have recourse to those nauseous remedies." A good tooth powder should be composed of tonic and aromatic ingredients, and contain nothing injurious to the enamel, should leave an agreeable taste and breath, and remove the daily accumulations and slimy substances from about the necks of the teeth, but should never act upon them so as to increase their natural whiteness.

à ce moyen de propreté; ajouterai-je que c'était par raffinerie qu'ils n'employaient que de l'urine conservée dans les citernes, comme, nous l'apprend Strabon dans sa Géographie, liv 3. '*Quippê qui urinâ in cisternis inveteratâ laventur, eâque cum ipsi, tum eorum uxores dentes tergant, quod Cantabros facere et eorum confines aiunt.*' Consultez aussi l'Histoire Universelle, par Diodore de Sicile, liv. v. c. 22"—*Duval's Dentiste de la Jeunesse*, p. 20.

RECIPES.

TOOTH POWDERS.

THE following recipes are written in a plain style, without using technical phrases, so as to make them intelligible to the general reader.

RECIPE, No. 1.

Peruvian bark	2 ounces,
Gum myrrh	1 ounce,
Cloves and cinnamon, of each	1 drachm,

Finely powdered and well mixed, make an excellent tooth powder.

No. 2.

Peruvian bark and orris root, of each	2 ounces,
Magnesia	1 ounce,
Gum myrrh	½ ounce,
Musk	1 grain,

Finely powdered and mixed, to which a little Dutch pink may be added to give it a pleasing colour.

No. 3.

Peruvian bark, gum myrrh, and orris root, of each	2 ounces,
Cream of tartar	1 drachm,
Cloves	1 drachm,

Finely powdered and mixed. If the teeth are discoloured, black, or green, this tooth powder should be used, but when they have their proper colour and are clean it should not be used, as the cream of tartar, owing to its chemical effects, acts upon the enamel.

No. 4.

Peruvian bark	2 ounces,
Red sandal wood	1 ounce,
Essential oil of cloves ..	10 drops,
Essence of bergamot ..	10 drops.

This powder cleans the teeth, perfectly strengthens the gums, and gives an agreeable odour to the breath.

No. 5.

Peruvian bark	1 ounce,
Gum myrrh	1 ounce,
Nitre	½ ounce,
Armenian bole	½ ounce,
Borax	1 drachm,

Finely powdered and mixed, constitute an excellent tooth powder when the gums are inflamed and spongy.

No. 6.

Gum myrrh	1 ounce,
Dragon's blood	1 ounce,
Pure alum	½ ounce,
Cream of tartar	½ ounce,
Musk	2 grains,

Finely powdered and mixed. This is an active powder, to be used occasionally if the teeth are much discoloured and the gums spongy.

TINCTURES.

No. 1.

Borax	2 drachms,
Tincture of myrrh	1 ounce,
Distilled rose-water	3 ounces,
Honey	1 ounce,

Make an excellent wash for tender gums.

No. 2.

Bark of oak, finely ground	1 drachm,
Sal ammoniac	2 drachms,
Sage-water	6 ounces,
Tincture of catéchu	2 drachms.

This tincture is used to rinse the mouth, when the gums, tongue, and adjoining parts are spongy, swollen, or inflamed.

No. 3.

ASTRINGENT GARGLE AND WASH FOR SPONGY GUMS.

Peruvian bark	1 ounce,
Alum	1 drachm,
Nitre	1 drachm,
Honey	1 ounce,
Distilled rose-water	4 ounces,
Soft water	4 ounces.

No. 4.

ODONTALGIC MIXTURE.

Sulphuric æther	1 drachm,
Tincture of opium	1 drachm,
Essential oil of cloves	2 drops,
Essential oil of thyme	2 drops.

A little lint or cotton dipped in this mixture is to be applied to the aching tooth.

No. 5.

Florentine orris root	8 ounces,
Pulverised cloves	1 ounce,
Ambergris	1 scruple,
Borax	1 scruple,
Rectified spirits of wine	1 quart.

A teaspoonful of this tincture, worked into a foam in the mouth, cleans the teeth and sweetens the breath.

No. 6.

Tincture of bark	1 ounce,
Tincture of myrrh ..	1 ounce,
Tincture of benzoin ..	1 ounce,
Tincture of guaiacum ..	1 ounce,
Tincture of catéchu ..	1 ounce,
Simple tincture of lavender ..	½ ounce,
Oil of cloves ..	2 drops,
Rose-water ..	1 pint.

These form a pleasing and excellent lotion for tender gums, &c.

No. 7.

TINCTURE FOR THE TOOTH-ACHE.

Cayenne	½ ounce,
Tincture of opium ..	1 ounce,
Oil of cloves	½ ounce,
Camphorated spirits of wine ..	1 ounce,
Spirit of nitre ..	1 ounce,

To be well mixed and stand for two days before using. A bit of lint or cotton dipped in this tincture, and laid on the gum or on the aching tooth, will give great relief, if not produce a cure.

No. 8.

STYPTIC TINCTURE.

Spirits of wine	..	..	2 ounces,
Blue vitriol	..	..	1 ounce,
Pure alum	..	..	½ ounce,
Gum arabic	..	..	½ ounce,

Well mixed, are an active styptic, and may be used with advantage to stop bleeding of the gums after extraction, cuts, &c.

No. 9.

DETERSIVE TINCTURE.

Pulverised cassia		..	2 ounces,
Cardamum seed		..	½ ounce,
Catéchu	..	..	1 ounce,
Gum myrrh	..	..	1 ounce,
Musk	..	..	2 grains,
Borax	..	..	1 drachm,
Pure alum	..	..	1 drachm,
Cochineal	..	..	1 drachm,
Spirits of wine	..	..	1 pint,
Soft water	..	..	1 pint.

These ingredients are to be well powdered, mixed, and let stand for two or three days in a warm place before using. They make a superior wash for sore or tender gums, and leave a fragrant breath.

No. 10.

ASTRINGENT MIXTURE.

Pure alum	1 drachm,
Tincture of bark	2 ounces,
Distilled rose-water	2 ounces,

Or,

No. 11.

Tincture of myrrh	1 ounce,
Nitre	½ ounce.
Alum	½ ounce,
Distilled rose-water	2 ounces.

When the teeth are loose, the gums spongy, and much heat or pain is felt, either No. 10 or 11 may be used, and will give great relief.

No. 12.

OPIATES.

Pure alum	1½ ounce,
Dragon's blood	3 drachms,
Cassia	1 drachm,
Gum mastic	1 drachm,

Finely powdered, to which is to be added honey sufficient to form them into a paste. This opiate is used with a tooth brush, and the mouth afterwards rinsed with warm water.

No. 13.

Pure alum	..	..	½ ounce,
Cochineal	..	..	½ ounce,
Cream of tartar	..	..	4 ounces,
Best honey	..	..	1 pound,
Oil of cloves	..	..	15 drops,

Well mixed, make an active opiate, whiten the teeth, and give a fragrant odour to the breath; but, like all powders, pastes, or tinctures containing alum, camphor, or cream of tartar, should be used but seldom and with caution, and the mouth well rinsed with warm water immediately after use.

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De Loude's Dentistry, plate 1.

Fig. 1

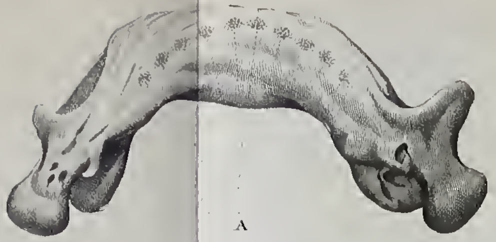


Fig. 2.

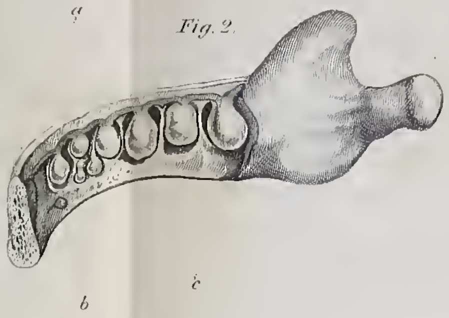


Fig. 3.

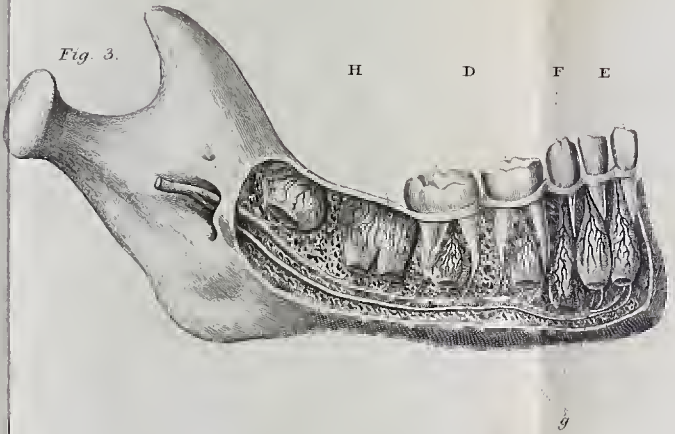
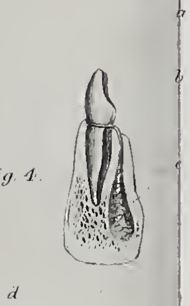


Fig. 4.



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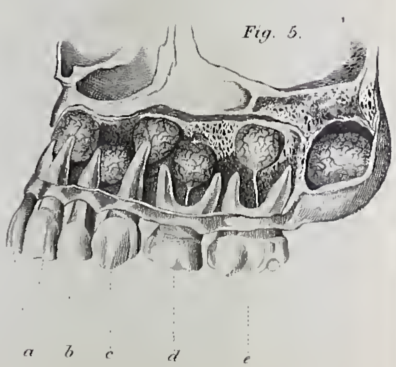
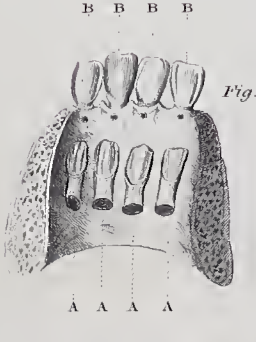


Fig. 6.



REFERENCES TO THE PLATES.

PLATE I.

FIG. 1—*taken from Mons. Serres—the lower jaw of a fœtus.*

A the vessicles containing the substance that is to be the teeth.

FIG. 2—*taken from Mons. Herrissant—a section of the lower jaw in a more advanced state.*

a the pulps that are to form the five primary teeth on that side of the jaw

b the pulps of the permanent teeth closely connected with the pulps of the first set

c the pulps containing the rudiments of the permanent molares.

FIG. 3—*taken from Professor Cloquet's work—a section of the lower jaw of a child between three and four years old.*

E the two temporary front teeth

F the temporary canine tooth

D the two temporary grinders

H the pulps that are to form the permanent molares

g the pulps that are to produce the permanent front teeth, canine tooth, and small grinders.

FIG. 4—*taken from T. Bell's work on the teeth.*

d the spongy bone of the lower jaw

a the temporary tooth

b the cord of connection that unites the temporary tooth to the pulp *c*, which is to form the permanent tooth or successor.

FIG. 5—*taken from T. Bell's work on the teeth—a section of the upper jaw exposing to view the five milk teeth.*

a, *b*, *c*, *d*, *e*, connected with the pulps that are to produce the permanent teeth.

FIG. 6—*a section of the part of the lower jaw of a child between six and seven years old.*

B, B, B, B, the crowns of the four incisors

A, A, A, A, the four rudiments of the permanent teeth that are to replace B, B, B, B, above which will be seen the four holes through which passes the cord of connection that unites the temporary tooth to the rudiments of the permanent teeth.

De Loude's Dentistry, plate 2.

Fig. 1.

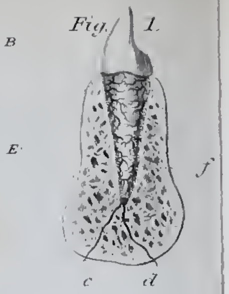
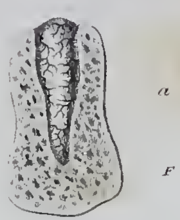


Fig. 2.



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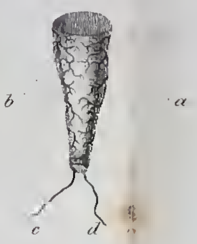


Fig. 8.

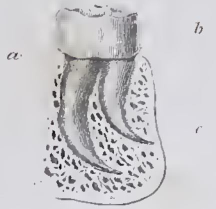
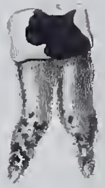


Fig. 4.



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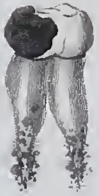


Fig. 6.

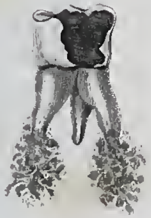


Fig. 7.

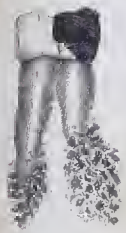
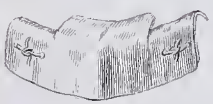
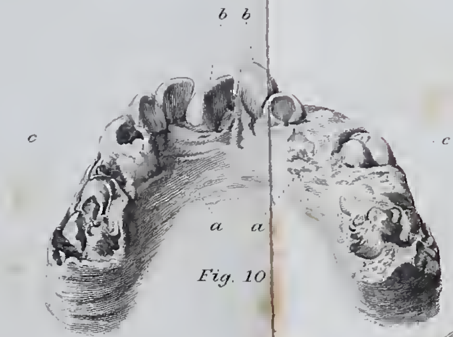


Fig. 13





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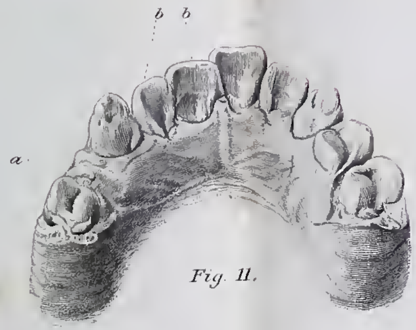
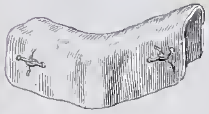
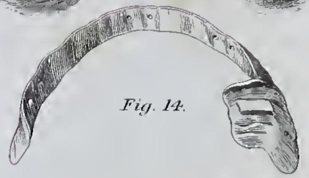


Fig. 11.

Fig. 12.





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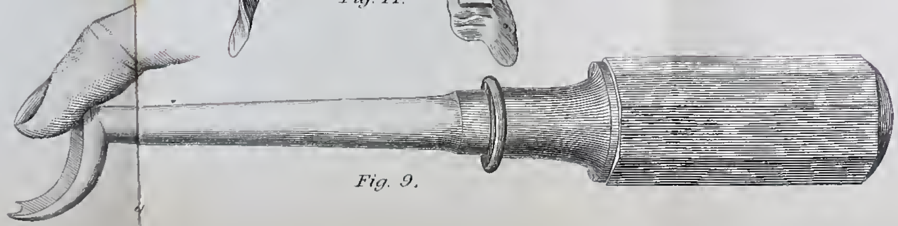

Fig. 9.

PLATE II.

FIG. 1—*a section of the lower jaw, with the tooth standing in its socket, surrounded by its lining or periosteum.*

a the crown of the tooth

B the neck or cervix

E the root in its lining or periosteum

f the spongy bone of the jaw

c and *d*, the nerve and artery entering the canal of the root.

FIG. 2—*the same section after removal of the tooth.*

a the periosteum

F section of the spongy bone of the lower jaw.

FIG. 3—*the periosteum.*

a top and bottom

b its numerous surrounding ramifications of blood vessels

c and *d*, artery and nerve entering the canal.

Figs. 4 and 5—*carious teeth, of which the points or fangs are in an inflamed state, and covered with detached yellow watery pustules.*

Fig. 6—*a tooth with fungous growth on the point of its fangs.*

Fig. 7—*a similar tooth in a more advanced state of a fungous growth.*

Fig. 8—*a section of the lower jaw, with a back grinder with bent roots, showing the result that must follow if the extraction be attempted on the outer side of the mouth.* See p. 124.

Fig. 9—*an elevator to remove roots and stumps with safety.* Description of, see p. 125.

Fig. 10—*a drawing of an upper jaw, with irregular teeth.* For description see p. 132.

Fig. 11—*a drawing of an upper jaw, with irregularity of one of the front and lateral incisors.* For description see p. 133.

Fig. 12 and 13—*models of plates used to correct the irregularities of jaws, Fig.* 11. For description see p. 134.

Fig. 14—*a model of a gold plate to correct the irregularities of the jaw, Fig* 10. For description see p. 132.

De Loude's Dentistry. Plate 3.

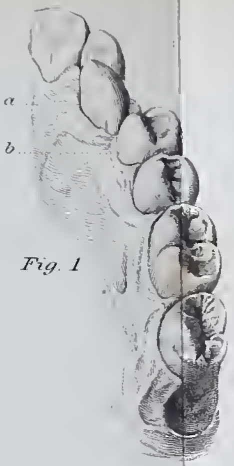

Fig. 1

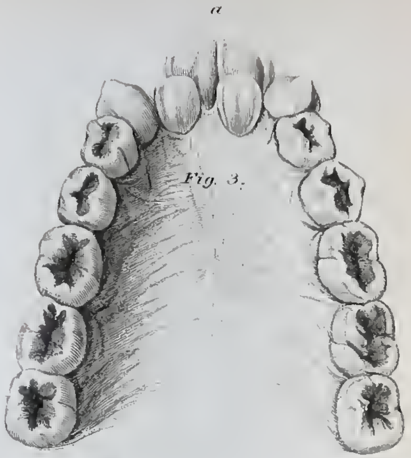

Fig. 3.

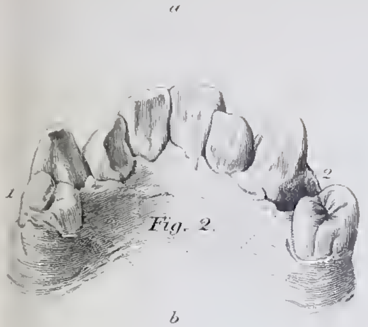

Fig. 2.

Fig. 4.

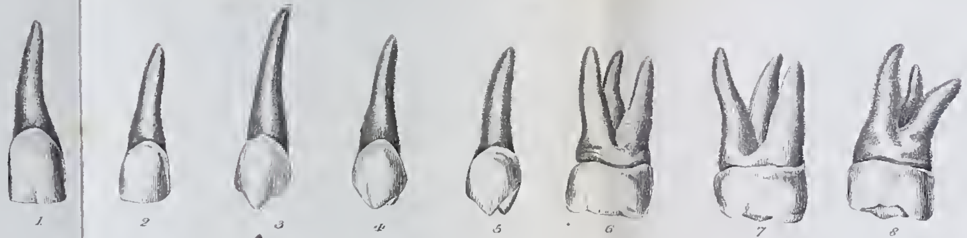

Fig. 5

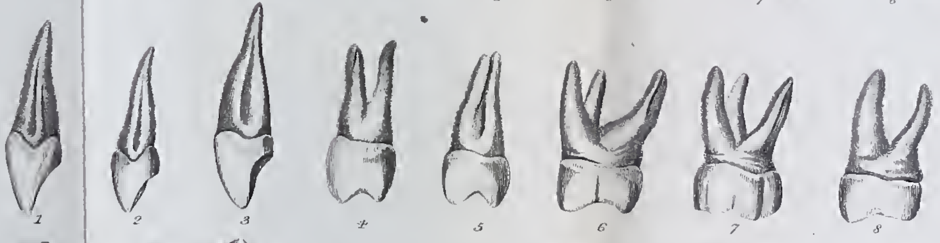

Fig. 6.

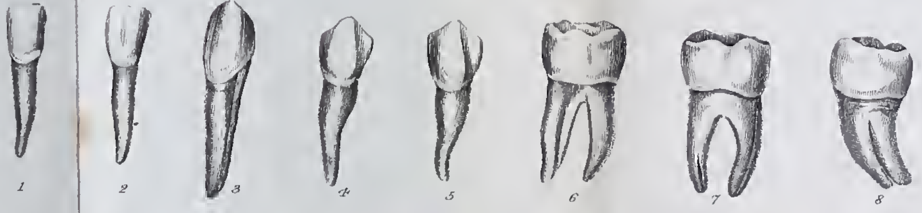

Fig. 7.

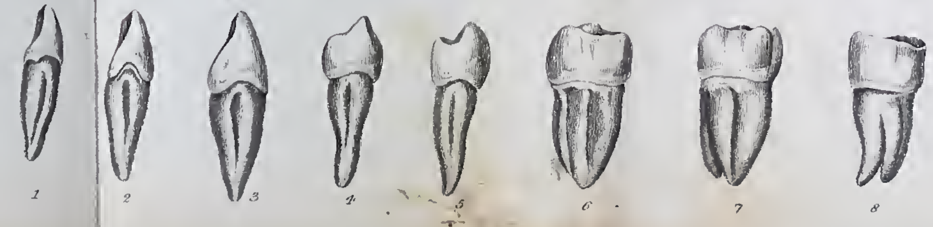

PLATE III.

Fig. 1—*a section of the upper jaw, with the front and lateral incisors in their proper place.*

a the cuspidati projecting inwards

b the first bicuspide, which must be extracted to make the cuspidati (*a*) fall into its proper place.

Fig 2—*a front section of the upper jaw.*

a the two lateral incisors projecting inwards. By removing the two first bicuspides (*b*, 1 and 2), laying before the front teeth a plate perforated with holes, and applying silk ligatures to the two lateral incisors (which should be renewed and tightened every twenty-four hours), those teeth will be brought into their proper circle.

Fig 3—*taken from Mons. De La Barre—a representation of the upper jaw.*

The two lateral incisors (*a*) are greatly out of their place, almost completely behind the front incisors, owing to the contracted state of the front of the jaw, and the non-removal of the temporary lateral incisors and temporary cuspidati.

FIG. 4—*a view of the permanent teeth on one side of the upper jaw, seen from the outside.*

1 the front incisor
2 the lateral incisor
3 the cuspidati
4 and 5, the bicuspides
6 and 7, first and second molaris
8 *Dentis Sapientiæ*, or wisdom tooth.

FIG. 5—*a side view of the same teeth.*

FIG. 6—*a view of the permanent teeth on one side of the lower jaw.*

1 front incisor
2 lateral incisor
3 cuspidati
4 and 5, first and second bicuspides
6 and 7, the first and second molaris
8 wisdom tooth.

FIG. 7—*a side view of the same teeth.*

Fig. 1.

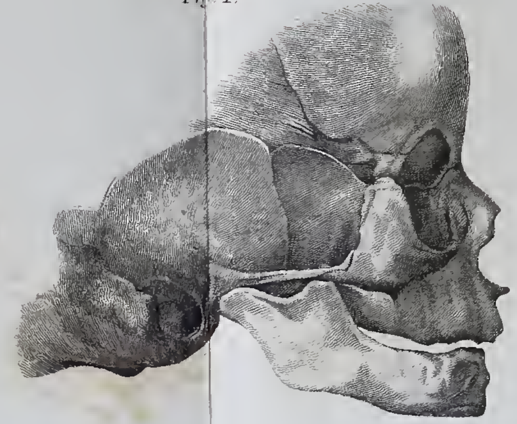

Fig. 2.

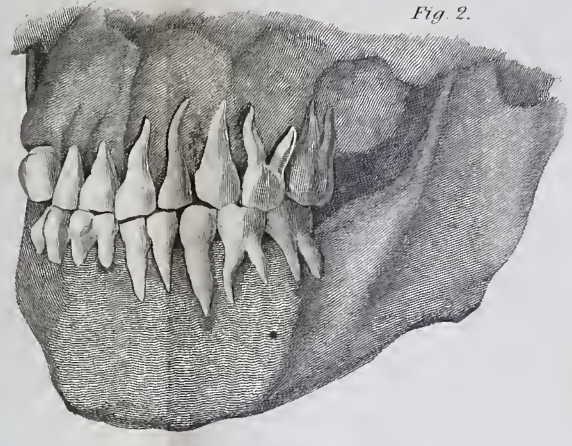

Fig. 3.

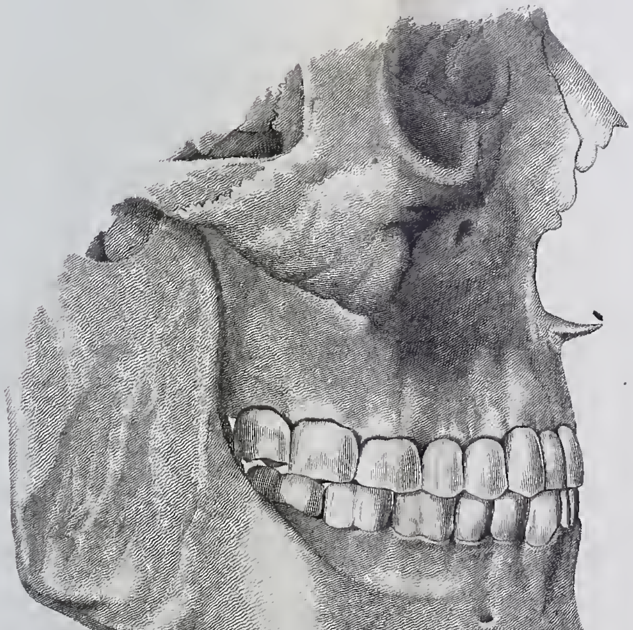

PLATE IV.

FIG. 1—*partly taken from* "L'Anatomie de l'Homme, par Bourgery"—*representing a side view of the toothless upper and lower jaw of a full grown fœtus.*

FIG. 2—*taken from Fuller's Essay on the Teeth—representing a side view of an upper and lower jaw, with the twenty temporary or milk teeth of a child between six and seven years old complete.*

FIG. 3—*a side view of the upper and lower jaw of an adult, having the thirty-two teeth perfectly complete and well planted.*

A. J. CALDICOTT, PRINTER, WOLVERHAMPTON.